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Environmental Assessment

Lava Cast Project

Bend-Ft. Rock Ranger District, Deschutes National Forest
Deschutes County, Oregon

T. 11 & 12 S., R.21 & 22 E.

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CHAPTER 1

PURPOSE AND NEED AND PROPOSED ACTION

INTRODUCTION

This environmental assessment (EA) describes three alternatives (two action and one no-action) for helping to achieve desirable forest conditions within an area on the Bend-Fort Rock Ranger District known as the Lava Cast planning area. The Lava Cast project proposes to treat some of the identified conditions to improve forest health and protect public lands in the Lava Cast planning area on the Bend-Ft. Rock Ranger District of the Deschutes National Forest. Some of these lands fall within and adjacent to boundaries described in the Upper Deschutes River Natural Resources Coalition (UDRNRC) Community Wildfire Protection Plans (CWPP) and the southern boundaries of the Sunriver CWPP.

On the Deschutes and Ochoco National Forests, the Lava Cast planning area is ranked among the priority areas at highest risk of loss of desirable forests due to forest health and hazardous fuel conditions. This high risk is due to the area's proximity to the rural communities in South Deschutes County and the potential of the forest conditions to deteriorate because of the imminent risk of loss to bark beetles. This area currently also has great potential for successful restoration of fire-dependent ecosystems and to help to meet that legislated goal within the Newberry National Volcanic Monument. Multiple forest management goals described by the Deschutes Forest Land and Resource Management Plan and the Newberry National Volcanic Monument can be met within this project area.

Chapter 1 includes a description of the:

- Purpose and need for action and Proposed Action
- Current and Desired Forest Conditions
- Management Direction
- Decision Framework
- Public involvement process used to develop alternatives to the proposed action,
- Issues concerning the proposed action that were a result of that involvement.

Chapter 2 includes a more detailed description of the proposed action and the alternatives. Chapter 3 is a succinct analysis of the environmental consequences of the proposed action and alternatives. Appendices to the EA include resource specialist reports or other supporting documentation with more background and detail to support the analyses. These reports are frequently incorporated by reference into the EA and are an integral part of the supporting documentation for the final line officer decision.

Location

The Lava Cast planning area is approximately 36,000 acres (Figures 1-1 & 1-6), including a portion of the Newberry National Volcanic Monument (Transition Zone, 5,935 acres).

Approximately 2,369 acres lie within the wildland-urban interface zone (WUI), which is generally defined as where communities or structures are adjacent to, or in some cases surrounded by forest vegetation. The planning area is located approximately 10 miles south of the urban growth boundary of Bend, Oregon in T. 20 S., R. 11and 12 E. and T. 21 S., R. 11and 12 E. Elevations range from 4,200 to 6,000 feet.

The westernmost boundary of the project area abuts the Little Deschutes River. There are no perennial or intermittent streams within the project area. Ephemeral channels may exist, but have no surface connection to any perennial streams. There are no lakes, ponds, reservoirs, or wetlands within the project area.

The Lava Cast project area lies primarily within the 110,166 acre 5th field Lower Little Deschutes watershed, but also extends into the 5th field Pilot Butte watershed (Coyote Springs, Mokst Butte West, Lockit Butte). The 6th field sub-watersheds that occupy most of the project area are Sugar Pine Butte and Kawak Butte West.

The Deschutes National Forest and Newberry National Volcanic Monument are divided into Management Areas and Zones respectively. The Deschutes National Forest Land and Resource Management Plan and the Newberry National Volcanic Monument Comprehensive Plan provide national forest managers with direction on the goals and objectives for the management of these lands. These goals and objectives are described in more detail later in this chapter. The following tables displays the Management Areas or Zones included in the Lava Cast planning area by plan.

Table 1-1: Planning area acres by Deschutes National Forest Plan Management Areas.

Management Area	Acres	% Area
MA 1 Special Interest Area (Lava Cast Forest- in NNVM)	3,297	9%
MA 2 Research Natural Area (Mokst Butte)	5	N/A
MA 8 General Forest	27,017	75 %
MA 9 Scenic Views	5,279	15 %
MA 15 Old Growth	298	< 1 %
Other Ownership	161	< ½ %
TOTAL PLANNING AREA	**36,057**	

There are no treatments proposed in the Special Interest Area, Research Natural Area or Old Growth management areas.

Table 1-2: Planning area acres by Newberry National Volcanic Monument Plan Management Areas.

Management Area	Acres	% Area
Transition Zone (which includes Lava Cast Forest)	5,935	16%

Approximately 2,369 acres also lie within an area known as the Wildland-Urban Interface zone (WUI). This is more specifically addressed later in this chapter, and is defined within the Upper Deschutes River Natural Resources Coalition Community Wildfire Protection Plan.

Within these boundaries, special legislative authorities and direction are added to existing management direction.

Approximately 383 acres of the 21,622 North Paulina Roadless Area is within the southeastern portion of the Lava Cast planning area. There are no activities planned within the roadless area.

Figure 1-1: Location of the Lava Cast Planning Area.

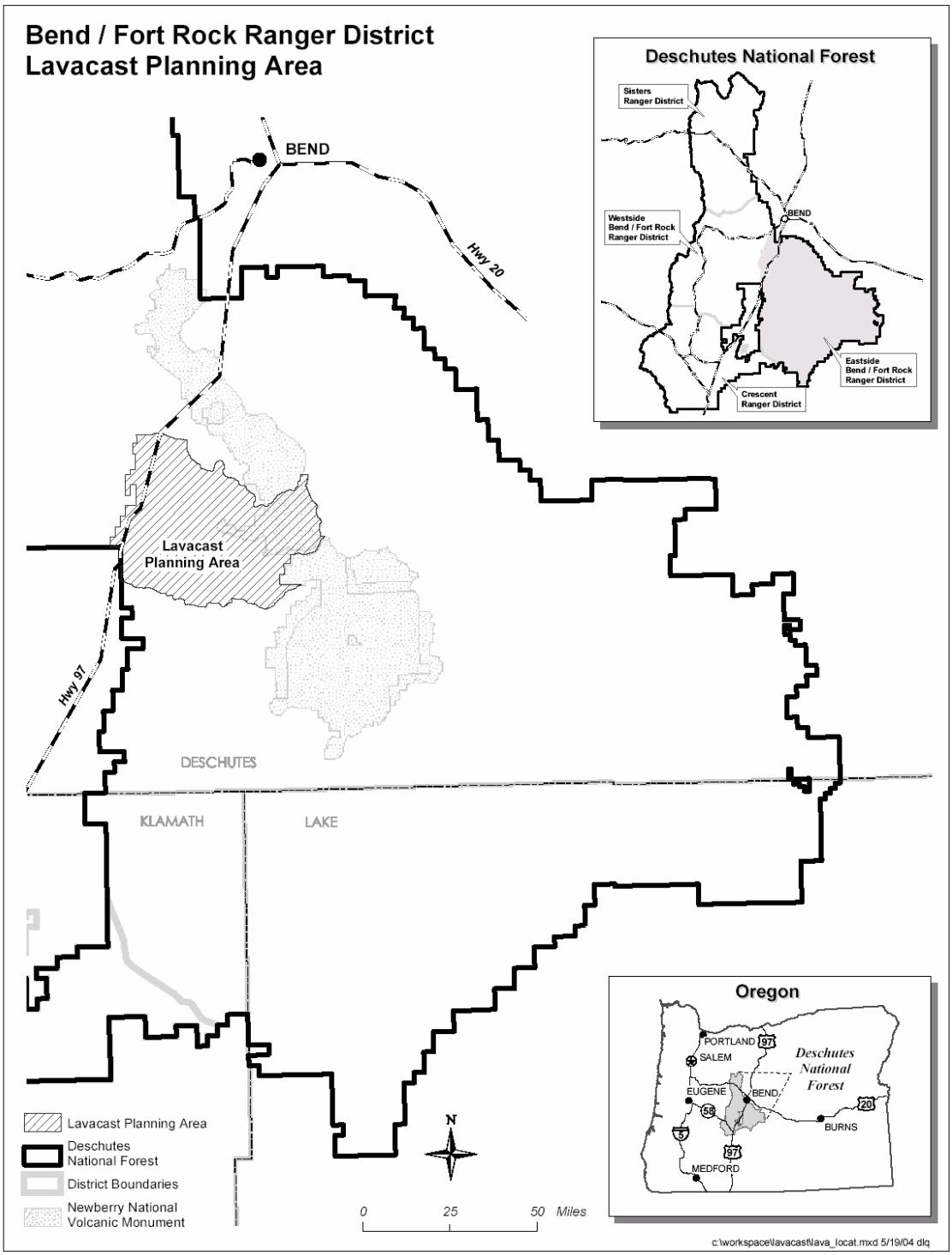
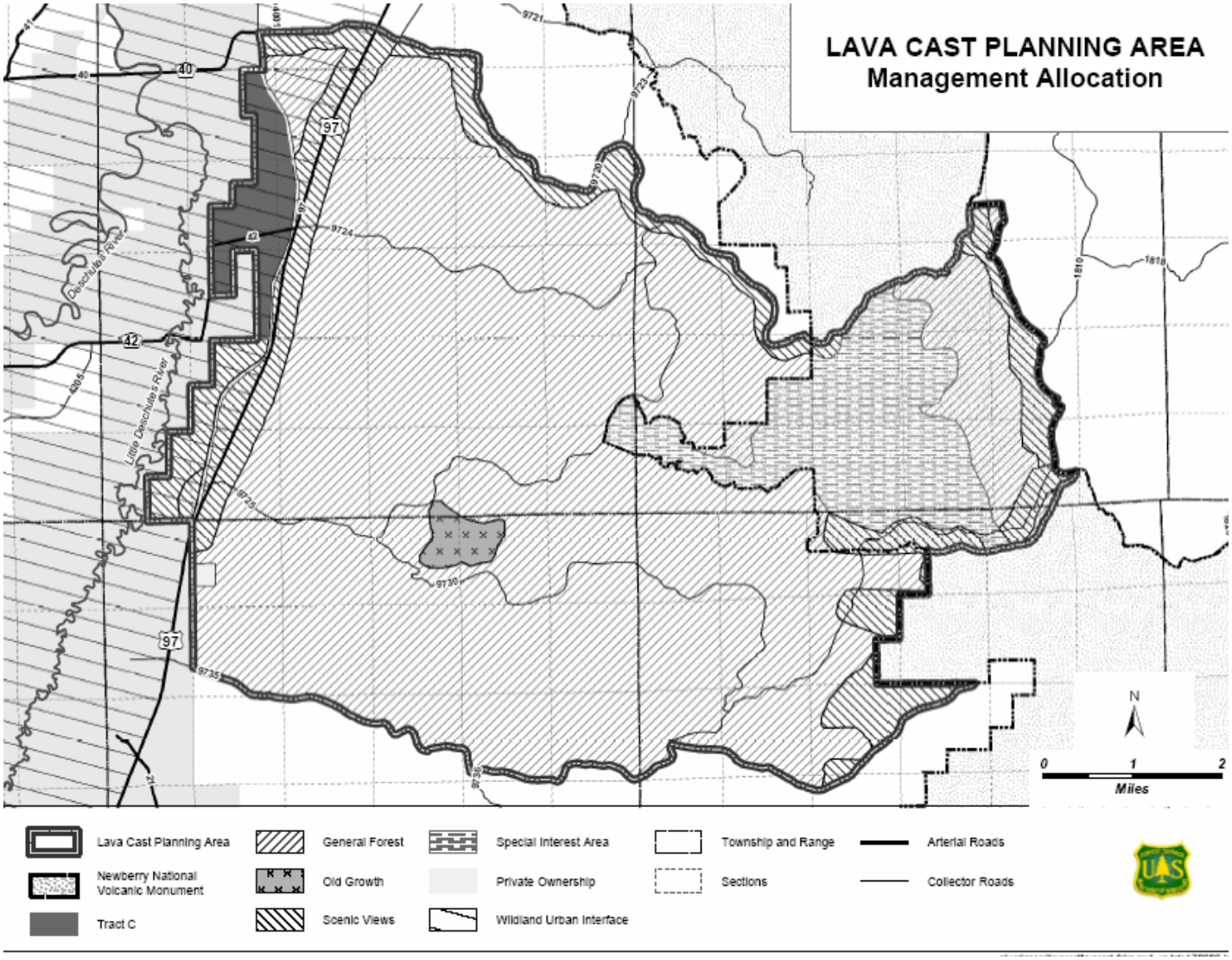


Figure 1-2: Management allocations for the Lava Cast Planning Area.



PURPOSE AND NEED AND PROPOSED ACTION

Management activities that are proposed within the planning area are guided by the strategic framework of the Deschutes National Forest Land and Resource Management Plan (USDA 1990) (Forest Plan), subsequent amendments to that plan (most notably the Regional Forester's Amendment known as the Eastside Screens), and the Newberry National Volcanic Monument Management Plan. The Forest and Monument Management Plans establish desired conditions for specific resources; Management Areas and Zones within the Forest and Monument, standards and guidelines by which activities must be conducted; and general objectives for goods and services that are expected to result from these activities. Management guidance within the Wildland-Urban Interface zone (WUI) is also provided by The Healthy Forest Restoration Act of 2003 (P.L. 108-148). These desired conditions, refined by actual site conditions and compared to the existing forest conditions, form the basis for the need to take action. Proposed actions are designed to promote these desired conditions.

Comparisons between existing and desired conditions demonstrate a need for forests that are more similar to historic conditions (for species distribution, size and structure, fire regime condition class and fuel models), and for forest conditions adjacent to communities (wildland-urban interface or WUI) that have a low likelihood to support crown fires and will provide for fire fighter safety. These conditions are expected to be more resilient to large-scale disturbances than current conditions. This would favor restoration of large diameter fire-dependent ponderosa pine-dominated forests and reduce the risk of large scale mixed conifer and lodgepole stand-replacing disturbance events from insects and wildfire. Changes in existing forest conditions must provide for continued suitable and sustainable wildlife habitats. Activities to meet these needs are expected to contribute to the economy of the area by providing jobs and wood products.

The combined emphasis for this planning area is for forest conditions that:

- approximate historic levels of late and old structural stages within watersheds over time;
- provide for commercial timber production that maintains or accelerates tree diameter growth rates while providing for wildlife habitat, recreational, and scenic values;
- provide wood products and job opportunities that contribute to local and regional economies, and
- provide for firefighter safety and reduced wildfire risk within the Wildland-Urban Interface.

The Forest Service proposes to thin trees, and mow, chop, or burn understory vegetation on about 9,534 acres within the Lava Cast area, and close approximately 10.5 miles of roads to public access (See also Chapter 2 – Alternative 2 for a more detailed description of the proposed action and alternatives). These actions would help to restore fire-dependent ponderosa-pine dominated ecosystems, reduce the risk of high-intensity stand replacement disturbance events - especially within the WUI - improve fire fighter safety, and provide for scenic and wildlife values. Proposed techniques include prescribed fire, mechanical shrub treatment (MST), non-commercial and commercial thinning. The proposed actions would provide benefits to the local and/or regional economy by providing an estimated 27 million board feet of commercical wood products, job and biomass utilization opportunities.

CURRENT AND DESIRED CONDITIONS

Changes in forest density, composition, and public use have occurred within the Lava Cast planning area since the early 1900s. Historical fire records (Agee, 1993) indicate low intensity fires maintained and thinned ponderosa and lodgepole pine stands in the eastern Cascades. These fires consumed understory vegetation, ground fuels and reduced the probability of stand replacing crown fire (Fire Regime I; see Fire and Fuels current and desired conditions). This frequent fire maintenance, which occurred on average every 7-10 years, helped to maintain ponderosa pine forest conditions that were relatively resilient to many large-scale die-offs from insects and growth retardants or deformities from disease.

Current forest conditions within much of the planning area will not support low-intensity fires through either natural or planned ignitions. Fire suppression since the early 1900's has allowed an increase of high hazardous fuel loading across the landscape, shifting forest fire effects today from frequent low severity to infrequent moderate and high severity stand replacing crown fires. Without the frequent low intensity fires that occurred in the past, ecological succession has been altered by fire suppression and has increased forest densities and changed vegetation species characteristics. Subsequently, the now mixed plant association groups (ponderosa pine, lodgepole pine, mixed conifer dry) within the planning area are at risk of mortality from insect infestation, stand replacing wildfire and from increased mistletoe infection.

Urban growth adjacent to the national forests has created additional need to maintain conditions that support low intensity fire behavior and safe areas for fire fighters to support fire suppression efforts adjacent to residential developments and other facilities and structures.

Historic Conditions

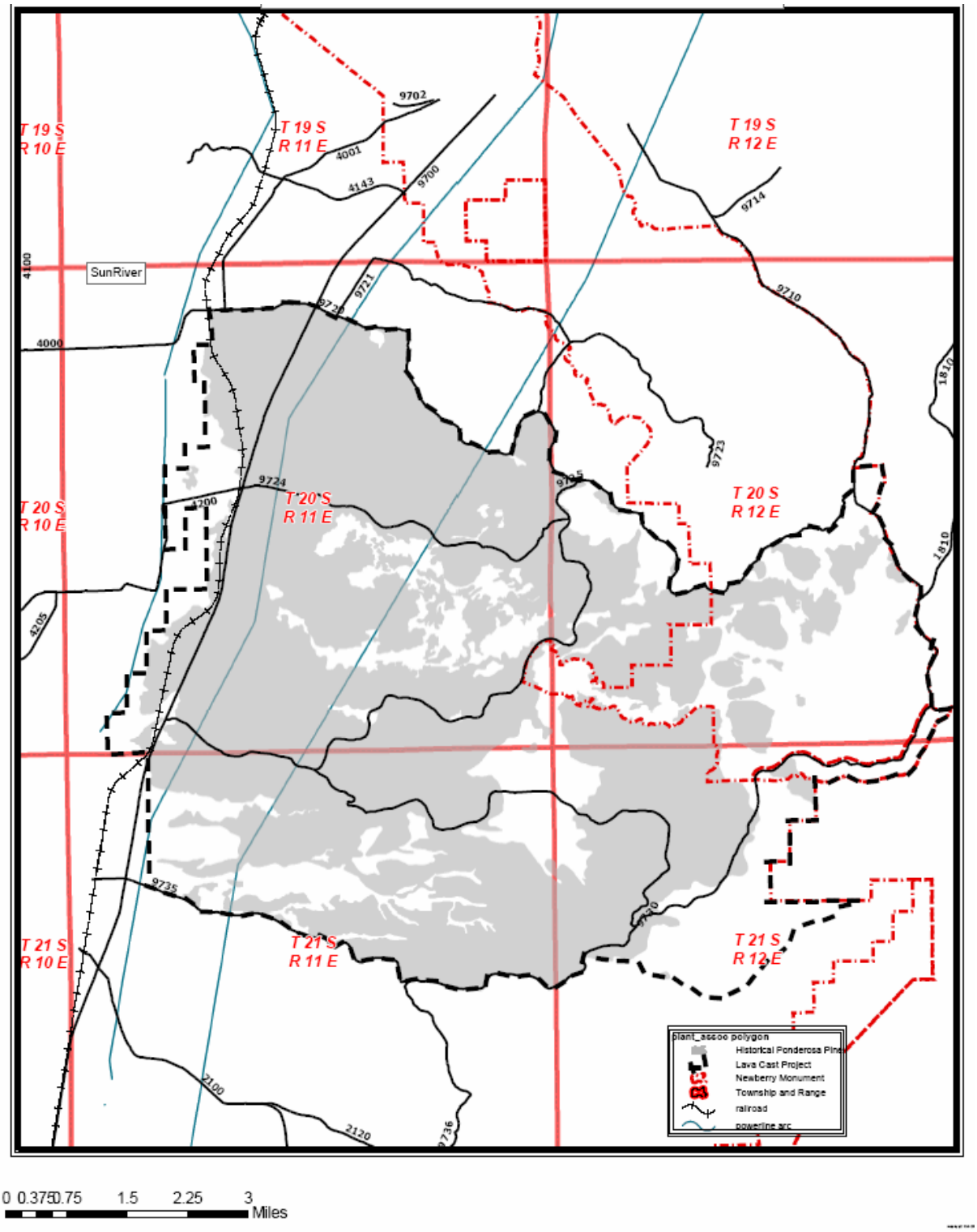
Historic range of variability (HRV) is an approach to ecosystem management and landscape restoration that is based on the premise of dynamic ecosystems where native species have adapted to disturbance-driven changes in their habitats (Bunnell 1995). A practical approach is to manage for landscape patterns and processes that fall within the historic range of variability rather than to manage and implement specific strategies for individual species. Historically ponderosa pine dominated most of the Lava Cast planning area in a variety of size classes and structures. (See Table 3-3)

The historical range of ponderosa pine in the approximate 36,000 acres of the planning area is about 25,000 acres, or nearly 70% of the planning area. These stands were maintained in an open condition with frequent fire, resulting in large ponderosa pine trees dominating the landscape. (See Figure 1-1)

Fire Regimes, Fire Condition Classes, and Fuel Models are also reflective of historic conditions of fire dependent ecosystems and are key variables for the assessment of wildand fire risk to communities and ecosystems. *Fire Regime* is the classification of the role fire would have played without human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). *Fire Regime* classifies the frequency and severity of fire in the role it would play on a landscape under forest conditions generally within the historic range of variability. *Fire Condition Class* is a classification of the amount of departure from the natural/historic fire regime. Condition Class I (low departure) through III (high departure), represent increasing levels of departure from the central tendency of the natural (historical) regime (Hann & Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2002). This equates to the historic range of variability (HRV) , considered a baseline for coarse-filter assessment of risks to ecosystems, habitats, and social views (Morgan et al. 1994, Hann et al. 1998, Landres et al. 1999) (*Mapping Fire Regime Condition Class: A Method for Watershed and Project Scale Analysis).*

Within areas historically dominated by ponderosa pine the desired condition is to have ponderosa pine as the dominant species in the size and structure classes that represent that

Figure 1-2: Historic range of dominant ponderosa pine in the Lava Cast Planning Area.



historic diversity; and to have fire regime condition classes and fuel models (see following sections for details) that reflect those historic and desired conditions. Once within this historic range of variability, natural fire frequency would help to perpetuate these conditions, with fuels similar to the historic fuels condition. It is also desirable to have the ponderosa pine stands resistant to beetle infestations.

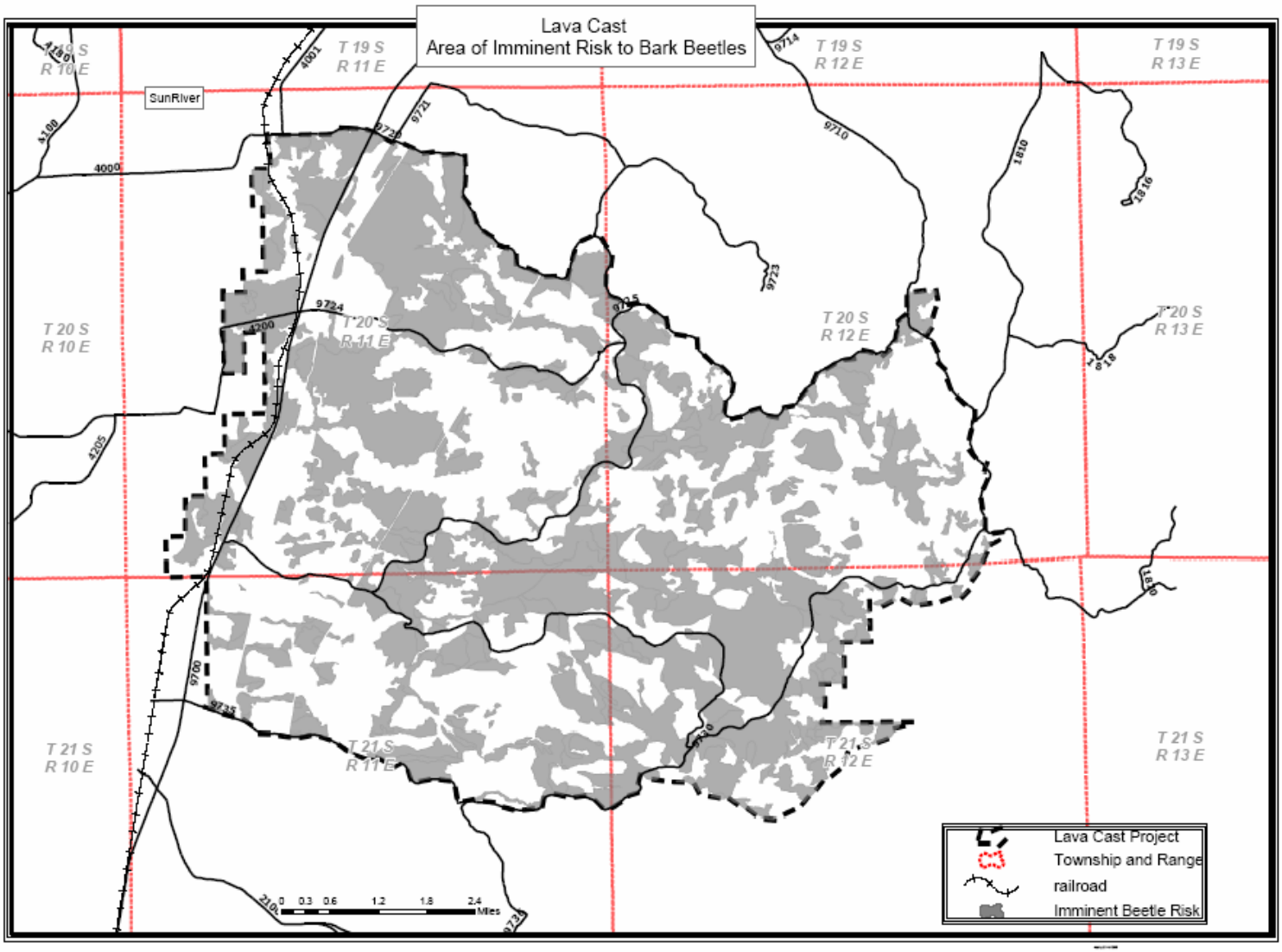
General conditions would reflect stands of large diameter, widely spaced ponderosa pine with low surface and ladder fuels which are resistant to fire and insect mortality. Desired forest conditions throughout the planning area include landscapes characterized by discontinuous hazardous fuels, including areas where hazardous fuels are broken up by reduced fuel loadings that support low intensity fire behavior unlikely to support high intensity wildfire. Areas unlikely to support high-intensity wildland fire are across the landscape and are of a size and orientation that reduces the likelihood of large fire spread, lessens post-wildfire damage, and/or facilitates successful fire suppression under severe wildfire conditions. Strategic locations are adjacent to private property, and to primary travel routes that provide safe egress or ingress including Highway 97 and Forest Service Roads 9720, 9724, 9725, 9730 and 9735.

Current Conditions

Current forest conditions within much of the area are not sustainable. As a result of fire suppression over the last 90 years the area currently is a mix of ponderosa pine, lodgepole pine and white fir. These stands tend to be dense, young and small diameter with higher fuel loadings than the historical condition. These conditions make the pine more susceptible to bark beetle infestations and fire mortality. Bark beetles in the planning area attack lodgepole pine and ponderosa pine typically larger than 9 inches in diameter that are in a stressed condition. Stress can be caused from a variety of factors - commonly lack of moisture, mistletoe or dense stocking. The trees in dense stands compete for water and other resources, causing tree stress and creating optimum conditions for large beetle outbreaks. (Sartwell & Stevens, 1975).

Mountain pine beetles were observed in the area during field reconnaissance and were usually in dense stands of trees. Western pine beetles affect mostly the larger trees while the mountain pine beetles affect smaller diameter trees, especially lodgepole pine. Small (9” dbh) ponderosa pine is also susceptible to mountain pine beetles when the primary host lodgepole pine is depleted or when the ponderosa pine is stressed. Prevention of outbreaks and reduction of mortality can be accomplished through reducing inter-tree competition and creating and maintaining tree stocking levels that reduce stress on trees.

Figure 1-3: Areas of imminent risk to bark beetles in the Lava Cast Planning Area.



Within the Lava Cast planning area 16,855 acres or 52% of the forested land is imminently susceptible to bark beetle infestation. Within the historical range of ponderosa pine approximately 11,000 acres or 44% of the area is imminently susceptible to bark beetle infestation.

Approximately 72% of the Lava Cast project area is in Fire Condition Classes II and III (hazardous fuel conditions, 54% and 18% respectively). Also, approximately 52% of the project area is in fire regimes 1 and 3 (0-35, and 35-100 year frequency and mixed severity), with Condition Class II and III. Fire exclusion in a short-interval, fire-adapted ecosystem has led to an increase in fire effects, creating the potential for costly and more damaging fires. Resilient ecosystems where natural/historical fire-prone ecological succession of vegetation can occur is not possible given these conditions. Specifically:

- Current stands are densely stocked with trees, including those of lodgepole pine that has encroached into ponderosa pine stands due to fire exclusion. There is a need for stands of fire-maintained, park-like, old-growth ponderosa pine closer to the historic range of variability across the landscape.

- Current forest conditions that include heavy fuel loadings, prevent use of wildland or prescribed fire to maintain old structure. There is a need for forest conditions where fire can play its key role in natural ecological processes within the Newberry National Volcanic Monument as well as other fire-dependent forests in the area.

- Forest resources - scenic, wildlife and recreation values and facilities are at risk from a large, destructive wildfire both within and outside of the planning area (i.e., Lava Cast Forest facilities and the flanks of Newberry volcano and facilities inside the caldera). There is a need to restore forest conditions that support protection of "at risk" resources from high intensity wildfire.

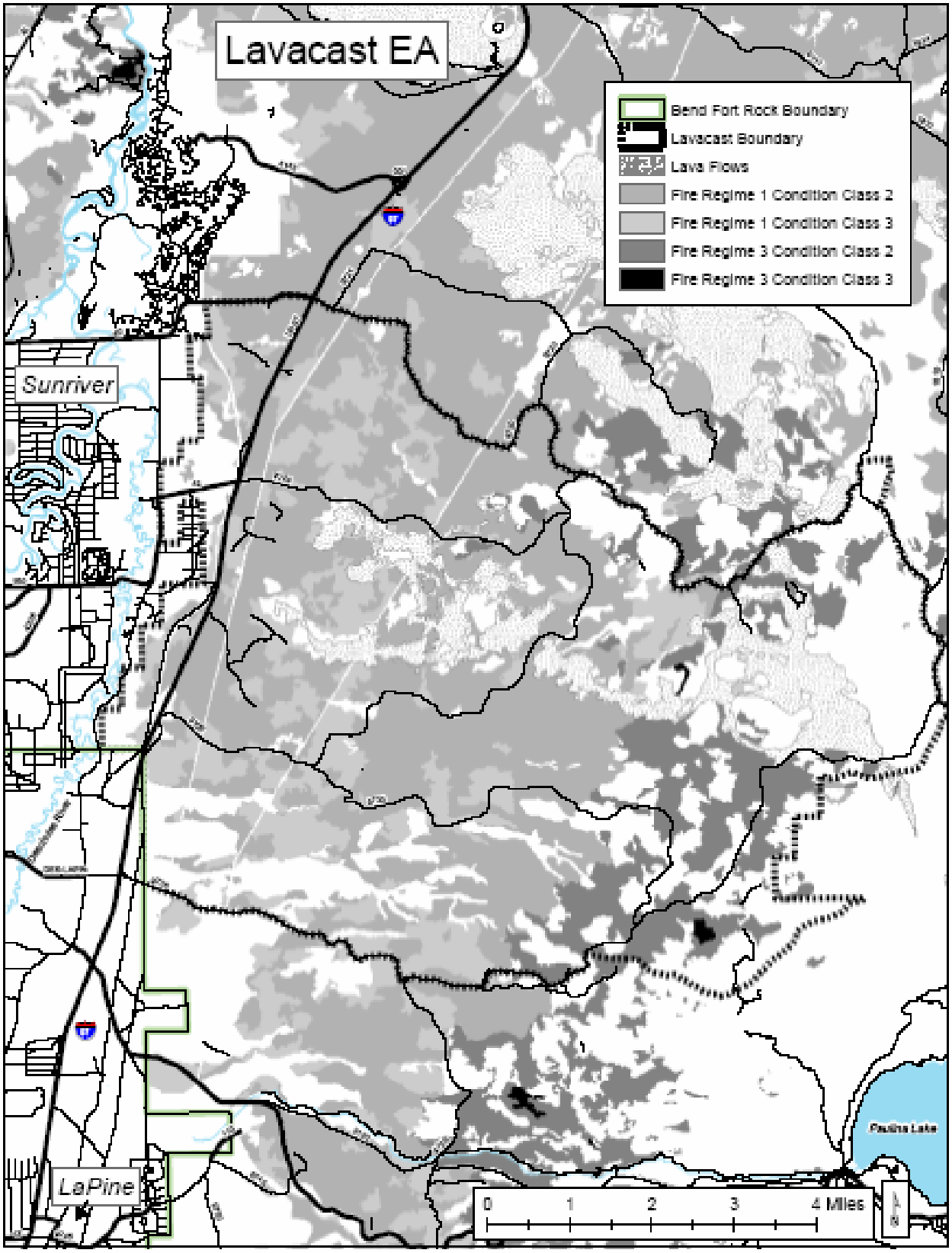
Wildland-Urban Interface

The Healthy Forest Restoration Act of 2003 (P.L. 108-148) was provided to expediate forest management planning that would result in the implementation of projects to reduce fuels to help protect communities from wildfire and restore the local fire-maintained ecosystem. To ensure its implementation, current collaboration between local communities and government agencies has produced Community Wildfire Protection Plans (CWPP) that identifies areas of high hazard and risk to wildland.

There are approximately 2,369 acres in WUI. Currently, fire hazard and fuel levels in the Wildland-Urban Interface (WUI) communities of Bend and Sunriver vary from low to high levels. Fire suppression during the last 80 to 90 years, combined with changed vegetative conditions, has increased the potential for higher severity fires that could result in greater instances of stand replacement wildfires than occurred previous to the establishment of Bend and adjacent communities. In the absence of fire, well developed shrub layers, encroachment of lodgepole pine, and high stand densities has placed the young ponderosa pine stands and adjacent WUI communities at high risk for stand replacing wildfires. Of particular concern are those high-density ponderosa and mixed ponderosa pine and lodgepole pine stands that are adjacent to or in the immediate vicinity of adjacent subdivisions, developed recreation sites and evacuation or access roads, and have not been treated with other actions (See Chapter 3, Past, present, and reasonably foreseeable future actions.)

The desired fuel conditions on federal lands in the WUI match closely with historic conditions for ponderosa pine forests of an open, large-tree dominated structure that is less susceptible to large-scale, stand replacing fire events. This correlates to Fire Regime 1 Condition Class I. This would create conditions that decrease the current risk of a large stand replacing crown fire that would put nearby communities in danger, and would create conditions that favor slow burning ground fires with low flame lengths. (Fuel Model 8 for mixed conifer and lodgepole stands and Fuel Model 9 in ponderosa pine stands.)

Figure 1-4: Fire Regime Condition Classes in the Lava Cast Planning Area.



MANAGEMENT DIRECTION

This section includes a brief description and summary of the documents that provide management direction for the proposed action and alternatives and affected management areas. Those management areas where no treatments are proposed are not listed below (i.e., Special Interest Area, Research Natural Area and Old Growth management areas). The proposed action and alternatives for this project respond to the goals and objectives, standards and guidelines described in the following plans and strategies.

Deschutes National Forest Land and Resource Management Plan (***Forest Plan as amended, 1990***) provides guidance for the use and protection of Deschutes National Forest resources consistent with legislative and policy requirements. It establishes Forest Wide and individual Management Area goals and objectives for resource protection and use, and standards and guidelines for activities that are conducted within those areas. All activities must be consistent with Forest Plan direction. Following is a brief summary of the goals and objectives for each National Forest Management Area (MA) (Figure 1-2) directly affected by the proposed action or alternatives.

- **General Forest (MA-8):** Emphasize timber production while providing forage production, visual quality, wildlife habitat and recreation opportunities for public use and enjoyment. Prescribed fire may be used to protect, maintain and enhance these. Slash will be treated to reduce chances of fire starts and rates of spread by the treatment of slash. Within this management area, approximately 680 acres of federal lands are designated for sale under legislative mandate. These are referred to as "Tract C" lands, and are not included in any proposed treatments.
- **Scenic Views (MA-9):** Provide Forest visitors with high quality scenery that represents the natural character of Central Oregon.

Newberry National Volcanic Monument Plan (1994) guides and has precedence after the legislation over all management and restoration activities within the congressionally designated Newberry National Volcanic Monument boundary. This is a stand alone plan that does not amend the Deschutes LRMP. It is not subject to the National Forest Management Act (NFMA). The Monument legislation requires natural vegetation ecological succession to the maximum extent practical, which is mirrored in the emphasis for vegetation management within the Monument Plan. The Monument Plan emphasizes reestablishing old-growth ponderosa pine ecosystems and the use of fire to maintain those systems wherever practical. The Lava Cast project includes portions of one Monument Management Zone.

Monument management goals, which are applicable to the Lava Cast vegetation resource within the Planning area, are:

- Ensure that the values and resources for which Newberry National Volcanic Monument was designated are protected, conserved, enhance and interpreted.

- Sustain or restore ecosystems and ensure ecosystem resiliency within the Monument and Special Management Area, while providing for natural ecological succession of vegetation to the maximum extent practical.
- Ensure that tree diseases, insect infestations, fire hazards, and fires within the Monument and Special Management Area do not seriously threaten resources outside the monument and Special Management Area boundaries.

- **Transition Zone:** This zone serves visitors interested in day-use recreational and interpretive opportunities, with emphasis on trail opportunities, both recreational and interpretive. Work to reduce fuel loads enough to allow safe reintroduction of fire (prescribed) without endangering large, old growth ponderosa pine.

Eastside Screens were implemented in August 1993 by the Regional Forester that provided management direction to eastside National Forests on retaining old-growth attributes at the local scale while moving toward the historic range of variability (HRV) across the landscape. A subsequent decision notice in May 1994 amended all eastside forest plans to include these standards.

To implement direction watersheds are characterized and compared for patterns of stand structure by biophysical environment to the HRV. The HRV is based on pre-Euro-American settlement era conditions.

Where Late Old Structure (LOS) is less than that found in the historical range, following of scenario A will occur and timber sale activities will:

a) Maintain all remnant late and old seral and/or structural live trees $\geq$21" dbh that currently exist within stands proposed for harvest activities.

b) Manipulate vegetative structure that does not meet late and old structural conditions, in a manner that moves it towards these conditions as appropriate to meet HRV.

c) Maintain open, park-like stand conditions where this condition occurred historically. Manipulate vegetation in a manner to encourage the development and maintenance of large diameter, open canopy structure.

There is also direction to maintain connectivity and reduce fragmentation of LOS stands by maintaining or enhancing the current level of connectivity between LOS and designated Old Growth habitats through a network pattern of connectivity corridors. Harvesting is allowed in connectivity corridors if some amount of understory is left in patches and the stand is managed within the top one-third of site potential.

Inland Native Fish Strategy (***INFISH, 1995***) delineated Riparian Habitat Conservation Areas (RHCAs) for riparian-dependent resources to 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 are to 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.

Management direction within INFISH requires Riparian Habitat Conservation Areas (RHCAs) to be delineated for watersheds. They are portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. There are no known riparian areas within the project area. There are no treatments proposed within RHCAs. There would be no effects to Essential Fish Habitat from any alternative.

DECISION FRAMEWORK

The Responsible Official for this proposal is the Forest Supervisor of the Deschutes National Forest. Based upon the information and analysis in this Environmental Assessment and public input, the Responsible Official will decide: To use commercial and non-commercial thinning, mechanical shrub treatments, prescribed burning, to 1) remove trees up to 21 inches in diameter trees to promote the return of open, park-like stands of large ponderosa pine stands; 2) improve forest health by reducing the effects of mistletoe and pine beetle; and 3) reduce natural fuels and wildfire risk.

The Forest Supervisor can decide to:

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

The decision regarding which combination of actions to implement will be determined by comparing how well the over all purpose and need is met by each of the alternatives and the manner in which each alternative responds to the significant issues. The alternative that, in the Forest Supervisor's judgment, provides the best mix of prospective results, and does so economically and efficiently, will be selected for implementation.

The Responsible Official will determine whether the selected alternative may have a significant effect on the quality of the human environment and whether an environmental impact statement needs to be prepared in accordance with the requirements of the National Environmental Policy Act.

PUBLIC INVOLVEMENT/SCOPING PROCESS USED

Announcement of the proposed Lava Cast project was included in the Central Oregon Schedule of Projects in the 2004 summer edition and all subsequent editions. This notification, through quarterly mailings, reaches approximately 3,200 interested individuals and groups. A Forest Service letter requesting public involvement was provided in May 2004 to approximately 107 individuals, businesses, and organizations that have expressed an interest in the project development process. Included in the mailing was The Bulletin, the local

newspaper that reported on the original Proposed Actions. The scoping letter was also placed on the United States Forest Service (USFS) web site. A summary of comments can be found in Appendix E.

Scoping responses were received from 13 groups or individuals. Their comments are a part of the public record. Most comments focused around the following activities:

- Fuel reduction and WUI: several respondents requested more treatments within the WUI than were originally proposed
- Vegetation management techniques.
  - There were general concerns that arose over the amount and size of trees proposed for commercial harvest. Some respondents did not want large trees to be harvested as part of the commercial thinning activities.
  - There was concern that the proposal to convert to ponderosa pine historic condition would reduce mixed conifer stands and wildlife habitat effectiveness

Also, two office meetings and three field trips were conducted for the Lava Cast project upon individual request by the following:

- On June 4 and 17, 2004, meetings in the Bend-Fort Rock Ranger District were with Paul Dewey and Stu Garrett to discuss thinning and burning in Newberry National Volcanic Monument. Wanted to be sure that "old growth" was protected and Monument objectives met.
- Blue Mountain Biodiversity Project - October 6, 2005 with Karen Coulter who suggested an upper diameter limit of 8 inches diameter breast height (dbh) on any proposed commercial harvest activities.
- Nature Conservancy – October 20, 2005 with Amy Waltz who advocated the need for a return of fire and fire-adapted systems in the project area.
- Oregon Natural Resources Council (now Wild Oregon) - November 1, 2005 with Tim Lillebo who expressed an understanding for the need for thinning to reduce fire hazard, but suggested a variable spaced thinning as an alternative to consider to more closely simulate historic conditions.

ISSUES

Comments provided as described above were assessed to determine whether they were relevant to the proposed action and suggested reasonable alternatives to the proposed action or additional information for the Responsible Official to consider. Comments which suggested reasonable alternatives to the proposed action were initially evaluated to determine whether they would meet the purpose and need of the proposed action. Those that would meet the purpose and need were considered in more detail, while those that would not were not considered in detail (See also – Chapter 2, Alternatives Considered But Eliminated from Detailed Study). These issues were used to:

1. Modify the proposed action sent out for scoping into the proposed action presented here (Alternative 2), or
2. develop alternatives to the proposed action.

The following issue descriptions summarize each of the issues, provide some brief background on the issue, summarizes the Forest Service response to the issue, and includes a "unit of measure" for tracking how each issue is resolved in the proposed action and alternatives.

Issue #1: After public scoping, a desire for more fuels reduction, especially in WUI, was identified. The WUI is at risk of fire from hazardous fuels on adjacent Forest Service land. Under current conditions, a fire in the WUI would threaten communities and other private property.
Discussion: The existing values of the WUI and the nearby community of Bend to the north, Crosswaters to the west, Sunriver to the northwest and LaPine and outlying subdivisions, such as Newberry Estates to the south of the project area, are at risk should a large stand replacing wild fire occur.
Response: Two separate projects (signed Categorical Exclusions to be implemented in 2007) were planned and included several units that were originally part of this project. Also, several new units were added to address this issue in Alternative 3.
Unit of Measure: The proposed acres of fuels in Condition Class II & III treated both in and out of WUI. Acres of fuels treatment adjacent to the WUI and along defensible space corridors that reflect change in fire behavior Fuel Models to desired Fuel Models 8 and 9.

Issue #2: Thinning of existing mixed conifer stands to promote ponderosa pine old growth and to reduce effects of mistletoe and beetle activity could affect diversity through conversion to single story ponderosa pine stands.
Discussion: Public comments discussed concerns that converting mixed conifer stands to ponderosa pine stands is not ecologically sound and would not benefit wildlife habitat. Specifically, comments stated that opening stands would further deplete available canopy closure and hiding cover over large blocks of land with the proposal and managing for single, isolated pairs of interior forest-dependent species (i.e. marten and northern Goshawk).
Response: Though the purpose is to move towards historic ponderosa pine conditions, implementation of this project would not be accomplished in one entry. The resultant stands would be at least two stories, not single story.
Unit of Measure: Acres of mixed conifer conversion to ponderosa pine compared to historic conditions (HRV). This would equate to amount of acres that correspond to Fire Regime Condition Class I.
Unit of Measure: Amount of conversion to ponderosa pine (acres) and effects of proposed treatment on wildlife habitat for indicator species.

Issue #3: There is concern that removing trees 12 inches and greater could reduce forest diversity, change the fuel moisture component, and increase the amount of brush. These combined activities could cause wildlife habitat fragmentation and increase, rather than decrease the risk of wildfire.

Discussion: Scoping comments described how retaining trees 12-21 inches in diameter would provide optimum long-term benefits of suppressing brush, maintain cool and moist ground conditions and reduce long-term maintenance cost (of forest stands).
Response: Not treating the 12-21 inch trees would not meet the purpose and need of moving towards ponderosa pine HRV conditions.
Unit of Measure: Acres proposed for treatment of stands with 12-21 inches diameter thinning and its effects on fuel conditions and management indicator species (MIS) wildlife habitat.

Issue #4: Thinning that enhances forest health should be done in a way that creates gaps, dense patches, lightly thinned, moderately thinned and heavily thinned patches in every stand.
Discussion: Public comments suggested that variable density prescriptions should be used when thinning forest stands.
Response: Development of Alternative 3 using variable density techniques to move towards ponderosa pine HRV.
Unit of Measure: Acres of mixed conifer conversion to ponderosa pine compared to historic conditions (HRV). This would equate to amount of acres that correspond to Fire Regime Condition Class I.

CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter includes a detailed description of:

- The No Action Alternative – Alternative 1
- The Proposed Action - Alternative 2
- Alternative to the Proposed Action – Alternative 3
- Connected Actions to Alternatives 2 & 3
- Project Design Criteria Common to Action Alternatives
- Alternatives considered but eliminated from detailed study,

Alternative 1 – No Action

The No Action alternative means that the federal actions described in Alternative 2 and 3 would not be authorized. Analysis of the No Action alternative provides us with a baseline snapshot of expected conditions if current trends were to continue and the management activities include in the proposed action and alternative were not authorized..

Some of these conditions and trends have been briefly described in Chapter 1 in the description of the desired and existing conditions, and Chapter 3 describes the effects of No Action in greater detail. This section provides a short summary of the resources and conditions potentially affected by the proposed action and alternatives to the proposed action.

The No Action Alternative would mean that none of the federal actions proposed in this assessment would be authorized under this decision. This does not mean no actions have or would occur within the planning area as a result of other decisions currently being implemented or planned. Relevant completed and ongoing federal actions within or adjacent to the Lava Cast planning area include:

Hazardous fuels reduction within the WUI zone is an active program throughout Central Oregon. Within and adjacent to the Lava Cast project area approximately 2,193 acres of completed or planned hazardous fuels removal has or will occur by the end of 2007 (Lava Cast Fuels Reduction Project CE).

This alternative presumes that existing conditions and trends would continue in a generally predictable pattern based on comparisons with similar social conditions, vegetation types, fire regime condition classes, and existing fuel models. These predicted patterns would be expected to be modified primarily by actions taken by others outside of federal lands.

Alternative 1 would leave the area with 16,851 acres (of the 32,000 acres of forest land) of forested stands identified as being at high enough stocking levels to be imminently susceptible to bark beetle infestation (USDA Forest Service, White Paper: Definition and procedures for classifying stands as imminently susceptible to Insect Attack and Wildfire, 1996).

Lodgepole pine: Structure stage 6, and 7 lodgepole pine, which is considered LOS for this forest type, occurs within pockets throughout the planning area. Hopkins (1992) determined that lodgepole pine that is found in Central Oregon today is an anomaly since these forests generally never grew into contiguous structured forests. It was estimated that fire frequency in climax lodgepole pine forest would range between 20 to 30 years. Pre-European settlement would best be characterized as vast stands of variously aged and sized lodgepole pine trees with average stem size being probably two – four inches in diameter at ground level. As a result of fire suppression since the early 1900's stands grew into the larger, denser size classes that we more commonly see today. Due to the amount of past beetle infestation and subsequent harvest activities, it is highly fragmented. As a result, there is a contrast in these areas consisting of early and late seral lodgepole pine. These older stands of lodgepole pine provide habitat for LOS species such as black backed and three-toed woodpeckers as well as movement areas for other interior forest species such as American marten and goshawk. Beetle activity has slowed but continues in these stands as well as infestations of dwarf mistletoe, many of the trees are losing their vigor or are dead.

Ponderosa pine: The planning area consists of approximately 729 acres of LOS ponderosa pine which is approximately 2% of the planning area. The majority of the ponderosa pine stands were harvested initially in the 1930's and the LOS that remains are the residual unharvested stands. The LOS PAGs (PPW and PPD) provide habitat for a variety of species that rely on multi-layered forest canopies such as the northern goshawk, white headed woodpecker, and a variety of neotropical migratory birds (See Landbirds section in Chapter 3). This forest type also provides excellent forage and cover for big game and a variety of small mammals. However, due to current stand densities there is the risk of high-intensity, stand-replacing wildfires that would kill the old trees associated with these areas.

Mixed Conifer: The mixed conifer habitat within the planning area is predominantly comprised of ponderosa pine, lodgepole pine, and white fir. There is approximately 490 acres of mixed conifer LOS, scattered mainly within the eastern part of the planning area in small (<50 acre) patches, which, in total, equates to 1% of the planning area. Species such as goshawks, Cooper's hawks, sharp-shinned hawks, marten, hermit thrush, brown creeper, and Williamson's sapsucker are associated with mixed conifer habitat, especially the multi-layered canopy aspect found in this habitat type.

The following tables display various aspects of current forest vegetative conditions and modeling.

Table 2-1: Historic Range of Variability by Plant Association Group (PAG) and Structure Stage (SS).

Plant Association Group (PAG)	Structure Stage	SS	HRV Range	Current & Alt 1
Lodgepole Dry (LPD)	Stand Initiation	1	16-48%	13%
	Stem Exclusion Closed Canopy	3	1-28%	20%
	Understory Reinitiation	4	11-20%	51%
	Multi-story without Large Trees	5	4-31%	14%
	Multi-story with Large Trees	6	4-10%	2%
	Single-story with Large Trees	7	16-48%	<1%
Mixed Conifer Dry (MCD)	Stand Initiation	1	7-18%	7%
	Stem Exclusion Closed Canopy	3	5-51%	39%
	Understory Reinitiation	4	5-11%	25%
	Multi-story without Large Trees	5	6-48%	21%
	Multi-story with Large Trees	6	5-27%	5%
	Single-story with Large Trees	7	5-15%	2%
Ponderosa pine dry (PPD) & ponderosa pine wet (PPW)	Stand Initiation	1	0-13%	7%
	Stem Exclusion Closed Canopy	3	2-14%	14%
	Understory Reinitiation	4	2-19%	43%
	Multi-story without Large Trees	5	4-31%	32%
	Multi-story with Large Trees	6	5-30%	2%
	Single-story with Large Trees	7	20-60%	1%

Table 2-2: Acres of LOS Structure Stage (SS)* by Plant Association (PAG).

PAG	SS6	SS7	Total by PAG
LPD	165	36	201
MCD	340	150	490
PPD/PPW	515	214	729
Totals by SS	1,020	400	1,420

* SS 6 = Multi-stratum with large trees; SS 7 = Single stratum with large trees (for further definition see Eastside Screens Direction. LPD = lodgepole pine/dry; MCD = mixed conifer/dry; PPD = ponderosa pine/dry; PPW = ponderosa pine/wet.

Table 2-3: Current fuel model acreage, description and associated fire behavior potential.

Fuel Model	Description	Acres	Fire Behavior Potential	Percent of Planning Area
2,9	2- short grasses in pine, 9- long –needle litter	8,885	Moderate	25
5,8	5-young or low green shrubs, 8-compact conifer slash	2,063	Low	6
3,10	3-tall grasses, 10-dead down woody fuels	8,531	High	24
6	shrubs	12,931	Extreme	36
Non-Veg.	Non- veg., lava flow	3,635	Low	10

Table 2-4: Fire Regime acreage for the Lava Cast planning area.

Fire Regime	Acres	Percent of Planning Area
1	19,706	55
3	6,457	18
4	6,365	18
5	12.8	0.0
Rock	3,503	10

Table 2-5: Fire behavior potential for the Lava Cast planning area.

Fire Behavior Potential	Acres	Percent of Planning Area
Extreme/High	21,462	60
Moderate	8,885	25
Low	5,698	15

Alternative 2 - Proposed Action

Background

This proposed action was developed by modifying the proposed action sent out in the May 2004 scoping letter. The proposed action in that letter has been modified as described in the "Alternatives considered but eliminated" section of this chapter. The proposed action was modified primarily by eliminating some areas from consideration for treatment in this proposal. This alternative proposes commercial thinning and fuels treatment to reduce bark beetle susceptibility and fuels on 9,512 acres. Alternative 2 would move stands towards late old growth structure (LOS) without being susceptible to beetle infestations on approximately 20,110 acres, or 62% of the planning area. This alternative also decreases to 6,858 acres dense forest stands susceptible to bark beetles. Alternative 2 proposes approximately 883 acres of treatments in the Wildland Urban Interface.

Table 2-6 delineates vegetation treatments proposed for this project and alternative.

Table 2-6: Proposed Action and Purpose and Need

Purpose	Need	Treatment Type	Objective	Unit Number	Alt 2 acres	Alt 3 acres	Alt 3 w/out LOS harvest
Move stands toward historic range of ponderosa pine and are resistant to bark beetle infestations and fire.	Create and maintain stand densities which will not support bark beetle infestations.	**Commercial Thinning Only**	Thin from below to 40 – 60 sq feet basal area favoring ponderosa pine	18, 20-22, 114, 117, 123, 125, 132, 136, 141, 152, 164, 177, 185, 194, 244, 259-266.	1,030 7 ac LOS	1,030 7 ac. LOS	1,023
		With Non-commercial Thinning (Bold units not in Alt 3)	Thin from below to 40 – 60 sq feet basal area favoring ponderosa pine Fell submerchantable trees excess to desired stocking levels where needed	17, 19, 25, 26, 32, 45, 121, 122, 124, 129, 134, 135, 137-140, 142, 153, 160, 169, 170-172, 182, **187**, 193, 195, 246, 247, 273-275.	1,455 74 ac. LOS	1,441 62 ac. LOS	1,379
Move stands toward historic range of ponderosa pine. Return forest conditions that support introduction of fire.	Create and maintain crown densities, ladder and ground fuel loadings consistent with fire behavior fuel models 8 & 9 to create fire conditions that can be controllable by direct attack.	**Commercial Thinning and MST, or removal of down dead fuels w grapple piling and/or Prescribed Fire.**	Thin from below to 40 – 60 sq feet basal area favoring ponderosa pine Mechanical shrub treatment or prescribed fire.	28, 55, 57, 71, 76, 78, 80-82, 85, 106, 111, 112, 115, 118-120, 127, 128, 130, 131, 133, 150, 155, 158, 174, 180, 222, 223, 227, 249,251-253, 256, 269, 270, 272, 276, 278-280.	3,059 114 ac. LOS	2,903 5 ac. LOS	2,898
		With Non-commercial Thinning (Bold units not in Alt 3; *bold Italics* in *Alt 3only*).	Thin from below to 40 – 60 sq feet basal area favoring ponderosa pine Fell submerchantable trees excess to desired stocking levels where needed Mechanical shrub treatment or prescribed fire.	30, 31, 56, 62, 66, **69, 70,** 75, 77, 79, 83, 86, 107-109, **113**, 126, 143, 144, 145, 147, 148, 151, 154, 156, 157, 159, 161-163, **166**, 167, 173, 176, 178, 184, 191, 192, 242, 245, 248, 250, 254, 257, 267, 271, 277. ***369, 385***	3,083 253 ac. LOS	3,146 105 ac. LOS	3,041
Develop forest conditions that support firefighter and community safety.	Move stands from fuel model 3, 6 & 10 to fuels models 2, 8 & 9 within WUI.	**Commercial Thinning and MST, or removal of down dead fuels w grapple piling and/or Prescribed Fire (Bold units not in Alt 3; *bold Italics* in *Alt 3only*).**	Thin from below to 40 – 60 sq feet basal area favoring ponderosa pine Mechanical shrub treatment or prescribed fire.	53, 54, 58, 59, 60, 63, 64, **72**, 73, 74, 196, 197, 198, 201, 209, 214, 221, ***380, 382***,	885 ac. WUI 92 ac. LOS	975 ac. WUI 37 ac. LOS	938
Totals		**Totals**			**9,512**	**9,495**	**9,279**

The Lava Cast planning area was assessed to identify and prioritize specific areas across the landscape that are at a high risk of disturbance, including insect infestation, disease vectors, and natural and human caused wildfire. The proposed vegetative and fuel reduction activities would focus on and treat those areas identified at high risk to disturbance (see Chapter 3 for scope of analysis by resource for further information).

Treatments are intended to sustain, enhance, and protect long-term productivity and resiliency of the forested ecosystem while developing, enhancing, maintaining, and/or protecting wildlife habitat. The proposed treatments would reduce the hazard and risk of disease pathogens, insect vectors and high intensity crown fires to levels encountered in the historic past. Priority is given to and adjacent to WUI in the western portion of the planning area. Approximately 6,881 acres treated by underburning or mechanical shrub treatment (MST) would reduce the ground and ladder fuels and restore the dense ponderosa pine forests to historical conditions and natural fire disturbance regimes; creating Condition Class I. In the WUI, there are 878 acres of this type of fuels treatment. Also, this treatment would reduce ponderosa pine bark beetle susceptibility on 9,534 acres.

Logging systems used for this alternative are ground based. Whole tree yarding is utilized, with down dead firm wood lodgepole to be removed.

Commercial thinning entails thinning from below to reduce stocking levels. Trees would be spaced at an average basal area of 60, resulting in trees distributed fairly evenly across each thinning unit. Thinning from below removes trees selecting the smallest or least healthy trees first (usually trees which are intermediate in size or suppressed; could be of varying dbh, but not over 21 inches) then selecting trees that are competing with each other in the larger size groups. Trees in the larger size tend to be co-dominants and dominants. The maximum size to be cut would be 21" dbh. Selection of trees to be left in the stand is prioritized by species, size and health (damage and/or disease).

Commercial thinning is proposed on approximately 540 acres within seven late old structure (LOS) stands as defined by the Eastside Screens.

Precommercial thinning occurs through many of the harvest units to reduce the stocking of understory trees within the stands. Thinning would be done on 14 foot spacing between small diameter trees (less than 6") and spacing wider (20 ft. spacing) from larger diameter trees (greater than 6").

Stocking levels following the thinning treatments would meet minimum stocking levels and would not require reforestation activities.

In addition to the live trees to be thinned, other trees to be removed would be firm, down and dead lodgepole pine in previously unthinned units. Fuel loadings are calculated to reduce the intensity of fire behavior to enable direct attack and reduce negative effects should a fire occur. In units with machine shrub treatment and underburning, heavy dead and down lodgepole of 5" and above would be removed to reduce the intensity of prescribed burning (units: 30, 148, 162, 173, 180, 184, 271 & 272; total of 529 acres).

Following other activities some units will have fuels treated with machine shrub treatment (mowing or MST), which reduces fire intensity and allows for the reintroduction of fire through underburning. This treatment is conducted with a small track mounted caterpillar type tractor with mowing or chopping attachments. Treatment covers approximately 80% of identified unit area. Brush and light surface fuels are mowed leaving any large diameter logs or snags undamaged.

Underburning follows the previous treatments with the purpose of reducing surface fuels and reintroducing fire into the ecosystem. Underburning will occur on approximately 4,962 acres and would be conducted as a light underburn.

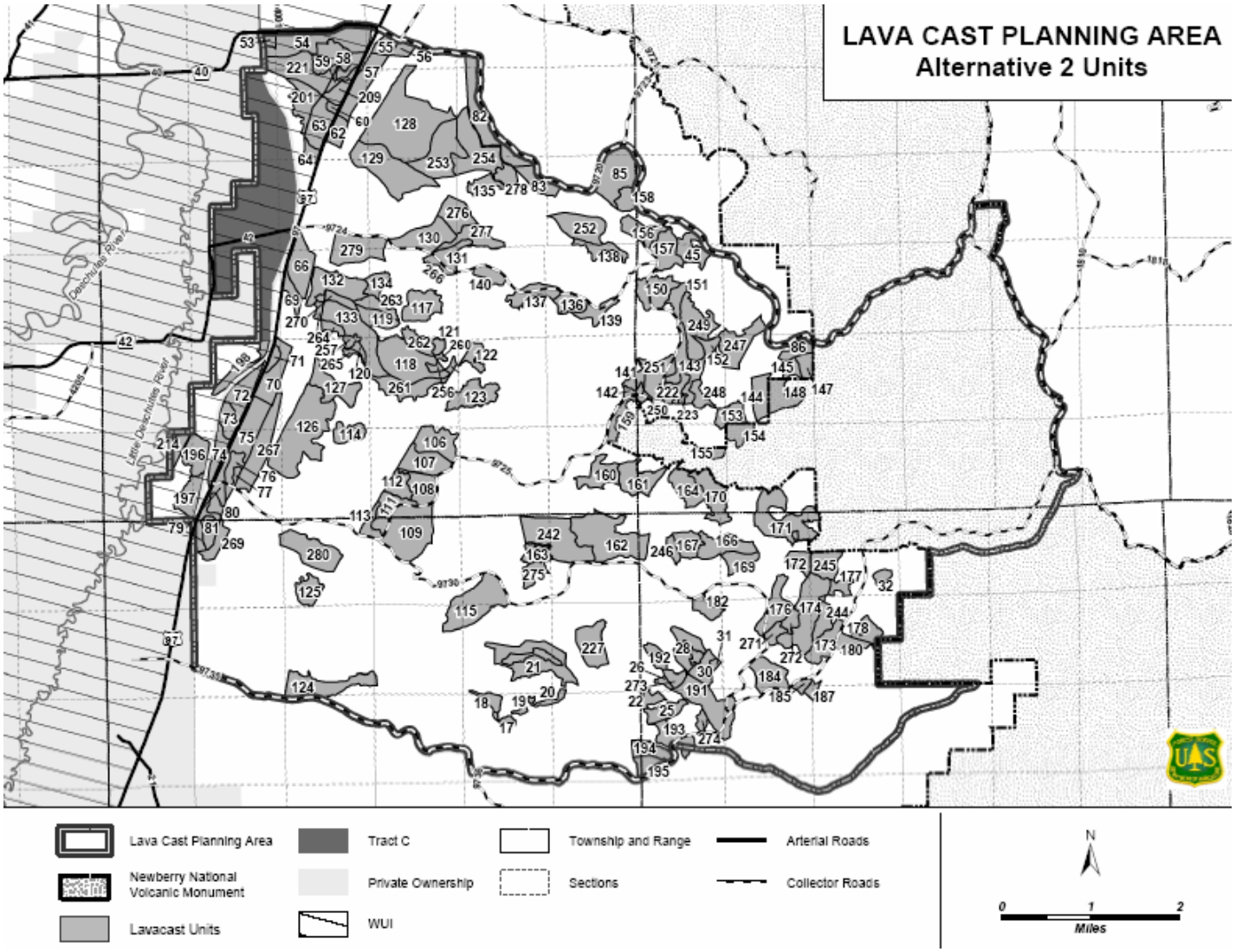
This alternative would reduce 9,512 acres (of 25,101 acres) of Fire Regime Condition Class (FRCC) II and III (moderate to high departure from "central tendency" of the natural historical regime) to Condition Class I and II. This contributes to the 10 year Comprehensive Strategy Implementation Plan goal to address and treat fuels conditions as described in the *Ochoco and Deschutes National Forests Five Year Plan to Accelerate Vegetation Treatments that Improve Condition Class*.

The combination of overstory removal, pre-commercial thinning, whole tree yarding, machine shrub treatment and prescribed tree spacing proposed in this alternative, creates an environment that allows the reintroduction of fire into the ecosystem with low intensity underburning in the ponderosa pine type. This would create a condition known as a historical natural fire regime (Condition Class I).

In the lodgepole and other non fire-adapted species, fuels reduction would be done by pre-commercial thinning (ladder fuel reduction) and handpiling or mechanical shrub treatment in critical WUI areas. This achieves the Forest Standard and Guideline for the Management Area fuels objective of reducing fuel loadings to a level that equate with Fire Behavior Fuel Models 8 and 9 and represent slow-burning ground fires with low flame lengths.

This alternative would retain approximately 184 miles of open road access and close approximately 10.5 miles of system roads (i.e. the road prism would remain but the road would be physically closed by gate, berm or other barrier), and decommission approximately 1.1 miles (physically remove the road prism with heavy equipment and return it to vegetation) to improve wildlife habitat for deer. This would result in a reduction of road density of 3.5 to 3.3 miles per square mile of roads across the planning area.

Figure 2-1: Lava Cast proposed vegetation treatment units for Alternative 2.



Alternative 3

This alternative is in response to comments suggesting that variable density thinning be considered as a harvest method. Variable density thinning would develop stands to be more resilient to influences such as wildfire and insects and disease outbreaks. Thinning would be done on approximately 9,299 ponderosa pine acres to create gaps of approximately 2 acres in size in the harvest unit. Thinning would also be done to varying degrees so that there are dense patches of vegetation along with light, moderate and heavily thinned areas. The alternative treats the units with the similar activities as Alternative 2, but thinning would be done on a wider spacing (35' as compared to the 14 to 20 foot spacing in Alternative 2) around all trees larger than 18" dbh. Also, in most of the ponderosa pine dominated stands, removing most of the lodgepole pine and white fir is proposed. The end result is a treated area that is more open, with clumps of dense vegetation interspersed throughout the treatment unit. There would be

no commercial treatment of LOS in this alternative. There are some acres of LOS within units in this alternative, as shown in Table 2-6.

Stands targeted for this treatment would be those, which are dominated by ponderosa pine (ponderosa PAG) but have a component of lodgepole pine and/or white fir. Removing the lodgepole pine and white fir would create openings in the ponderosa pine dominated stands. Stands selected for this would still meet stocking level objectives. Openings would be up to 2 acres in size with the understocked area not being more than 10% of the area. This would increase the structural diversity of the stands treated and increase the resistance to fire in the long run by having ponderosa pine dominate more stands.

To more quickly move towards historic conditions (HRV) stands targeted for this treatment would be those which are dominated by ponderosa pine (ponderosa PAG) but have a component of lodgepole pine and/or white fir. Removing the lodgepole pine and white fir would create openings in the ponderosa pine dominated stands. Stands selected for this would still meet stocking level objectives after treatment. Openings would be up to 2 acres in size with the understocked area not being more than 10% of the area. This would increase the structural diversity of the stands treated and increase the resistance to fire in the long run by having ponderosa pine dominate more stands.

In the long-term (50+ years) ponderosa pine allows for maintenance of these stands and the mimicking of historical fire return intervals through managed prescribed underburning. Two acre gaps in treatment units break up fuel continuity for fire spread, but would still require maintenance to discourage encroachment of ladder and flashy fuel components of brush, tall grasses and seedling trees.

This alternative would retain approximately 176 miles of open road access and close approximately 18.4 miles of system roads (i.e. the road prism would remain but the road would be physically closed by gate, berm or other barrier), and decommission approximately 1.1 miles (physically remove the road prism with heavy equipment and return it to vegetation) to improve wildlife habitat for deer. This would result in a reduction of road density of 3.5 to 3.1 miles per square mile of roads across the planning area.

Road Conditions and Actions Common to Alternatives 2 & 3

Road conditions within the Lava Cast planning area are in general need of resurfacing, brushing and drainage restoration. Within this planning area there are approximately 10 miles of maintenance level 3 road, and approximately 36 miles of level 2 “collector” roads and approximately 168 miles of level 2 “Local” roads.

Roads 9720 and 9720950 are maintenance level 3 roads that are considered to be HSA standards (Highway Safety Act). These roads are the primary routes for visitors to access the “Lava Cast Forest” within the Newberry National Volcanic Monument, a favorite recreational site which receives approximately 26,000 visitors annually. Both roads are in need of resurfacing. Current condition of these roads does not meet the appropriate HSA standard.

Collector roads 9710, 9724, 9725, 9730 and 9735 are the primary roads that serve this planning area. They have been used for many years without adding or maintaining adequate surfacing.

As such, these roads have deteriorated beyond a maintainable condition. Surfacing is minimal to non-existent and needs to be restored.

All routes will need to have danger trees removed and should be brushed out to restore roadside safety. Any danger trees cut down shall be in accordance to the new "Danger Tree Policy" and shall be identified by "Qualified" individual/s. All roadside brushing shall be done within the full road prism on all routes.

Resurfacing or spot surfacing material will be from an approved source to prevent the spread of invasive noxious plant species. Equipment used for maintenance/construction activities shall also be cleaned and inspected prior to traveling on National Forest lands.

Before any hauling on to commence on Roads 9720 and 9720-950, these roads would be resurfaced with 4" of compacted aggregate. Stabilizing the aggregate to lessen the amount of yearly maintenance needed to keep road in a suitable driving condition would be accomplished. If road maintenance funding is available these road would receive a BST 2 (Bituminous Surface Treatment) to further reduce yearly maintenance costs.

The collector roads (9710, 9724, 9725, 9730 and 9735) would receive a maintainable depth of aggregate/surfacing, and drainage along these roads would be maintained. This would occur before allowing log hauling over these routes.

Local system roads are native surfaced and do not require additional surfacing. Routine maintenance, blade/shaping, drainage, danger tree removal, road side brushing and spot surfacing where needed to prevent resource damage, would be the only requirements for these types of roads. Upon project completion these roads shall be maintained to a self- sustaining condition.

Temporary roads are roads used to access further reaches of timber sale units to extract timber more efficiently. These roads are usually short and in the Lava Cast planning there are 32 miles of road expected to access 144 units. The average length of temporary roads is 0.2 mile and the range of lengths is from less than 0.1 mile to 1.1 miles. Temporary roads are built to low specification, just enough to get equipment into landings and are obliterated at the end of the timber sale activity. (See Appendix D for a location map of proposed temporary roads.)

Proposed Site-Specific Forest Plan Amendments

One non-significant forest plan amendment is proposed in Alternative 2 in regard to Eastside Screens direction.

Amendment 1 (Alternative 2): This amendment would amend the Deschutes National Forest Land and Resources Management Plan, as amended by the Eastside Screens, to permit commercial thinning on 540 acres of late old structure (LOS) ponderosa pine and lodgepole pine stands to reduce the risk of loss due to insect and disease and to move these stands towards ponderosa pine historic conditions (HRV). This amendment would be specific to units: 59, 60, 63, 66, 69, 70, 72, 82, 113, 115, 124, 132, 156, 166, 173, 176, 178, 185, 187, 196, 201, 209, 221, 247, 254, 257, 267.

Forest Plan Amendment Significance Factors

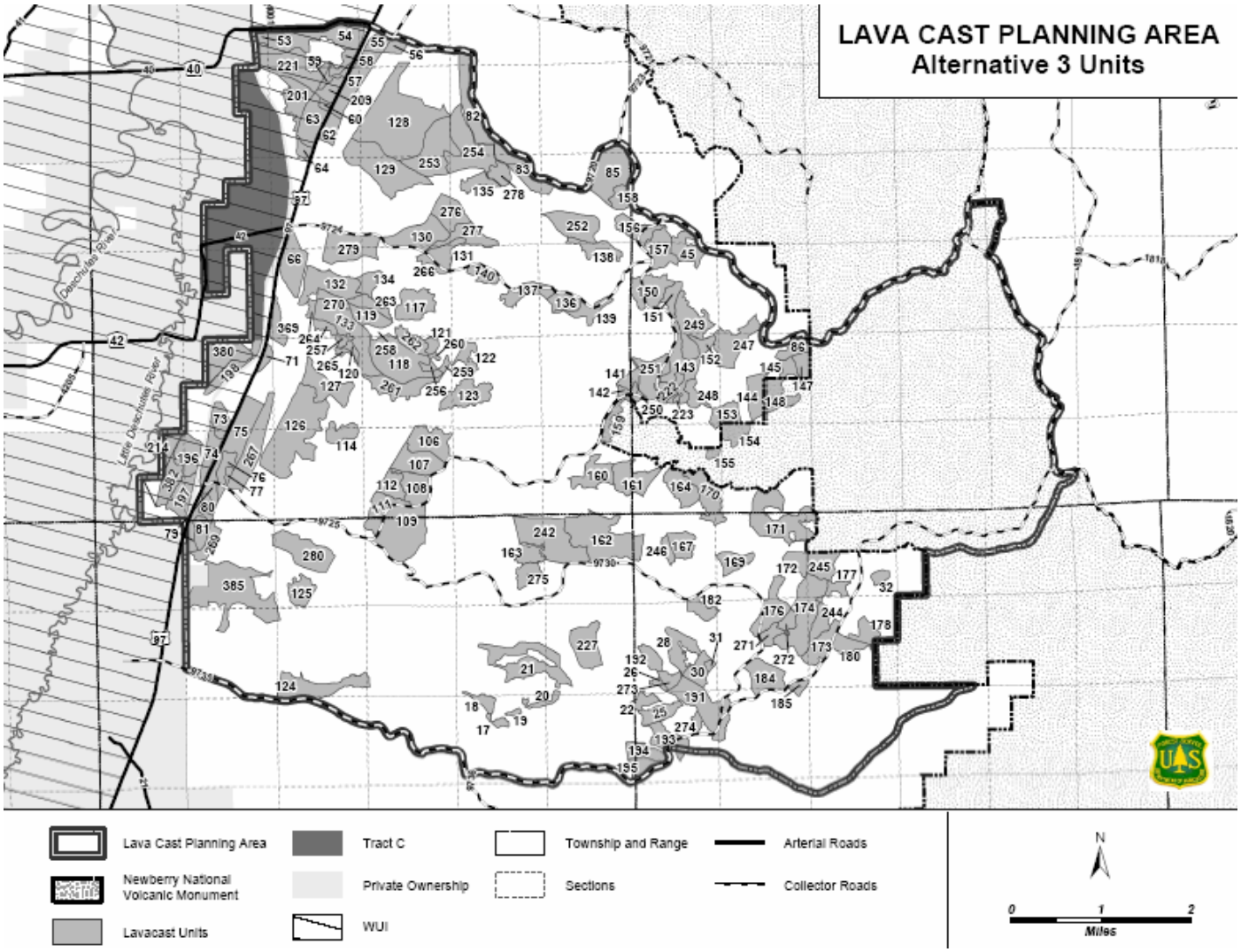
Timing: The Forest Service Planning Handbook (1909.12, 5.32) indicates that a change is less likely to result in a significant plan amendment if the change is likely to take place after the plan period (the first decade). This amendment would take place in the 16th year of the LRMP, would take place immediately, and are specific to this project. Additionally, the amendment to amend the Eastside Screens would take place in the 11th year after adoption of the Screens.

Location and Size: The amendment is specific to the units and acres identified above. All units are proposed for commercial thinning. Units are located within the Lava Cast Planning Area boundary.

Goals, Objectives and Outputs: This amendment would not alter the long-term relationship between the level of goods and services projected by the LRMP. Nor would it change management allocations where programmable timber harvest could occur. There would not be any significant change in timber outputs over what might be available if the project was designed without the proposed amendment. There would not be any change to the LOS classification in the proposed units.

Management Prescriptions: This amendment would not change the desired future condition for land and resources from that contemplated by the existing management direction in the LRMP and eastside screens in the short-term. Nor would it affect the entire LRMP planning area. It would only affect the 540 acres designated as MA-8 & 9 within the planning area boundary. The proposed amendment would not change the LRMP allocations or management areas. Nor would it change the LOS classifications for the effected stands They are classified as Late Structure multi canopy.

Figure 2-2: Lava Cast proposed vegetation treatment units for Alternative 3.



Comparison of Alternatives

The tables below provide definitions for proposed treatments as well as an overview and comparison of both action alternatives.

The treatments proposed in these alternatives don't result in immediate changes to condition class since the limiting strata (structure stage) are those with large trees and it takes time for the trees to grow into the larger size classes. Through the treatment of abundant and over-represented strata forest stands can move up into the next size class (structure stage).

Table 2-7 Treatment acres by Management Area for Alternatives 2 & 3

Forest Plant Management Area	Acres of MA in Planning area	Alternative 2 Acres of Proposed Commercial Harvest	Alternative 3 Acres of Proposed Commercial Harvest	Alternative 2 Acres of Proposed Harvest in WUI	Alternative 3 Acres of Proposed Harvest in WUI
MA 8 General Forest	27,017	7,574	7,542	201	174
MA 9 Scenic View	5,279	1,807	1,820	692	764
NNVM Monument Transition Zone	5,393	153	153	0	0
Totals		**9,534**	**9,515**	**893**	**938**

In general, the thinning in Alternative 2 is more evenly spaced, resulting in a landscape with a more consistent flow of forest vegetation in the treatment units, with close spacing between trees. This also results in more of a mix of forest vegetation that does not strongly favor ponderosa pine.

Table 2-8: Comparison of treatment types by alternatives.

Activity		Alternative 2	Alternative 3
Total Treatment Area	acres	9,534	9,515
Commercial Harvest Area	acres	9,534	9,299
Treatment Type			
Precommercial thinning	acres	4,864	5,005
Mechanized Shrub treatment	acres	4,609	4,606
Underburning	acres	4,962	4,703
Hand piling	acres	534	867
Dead Wood Removal & Grapple Piling	acres	981	981
Estimated wood fiber volume to be harvested	Mbf	27,558	26,373
Total treatment in WUI	acres	893	975
Total Harvest in WUI	acres	888	947
Estimated Temporary Roads	miles	32	32
Road Closures	miles	11	18
Road Decommissioning	miles	1.1	1.1

In general, thinning units in Alternative 3 are more widely spaced, resulting in a more open landscape that is dominated by ponderosa pine stands, with clumps of mixed conifer interspersed throughout.

Though the acreages are similar between the two action alternatives, the resulting treatments would be very different on the ground both visually and in regard to moving toward ponderosa pine HRV (Condition Class I).

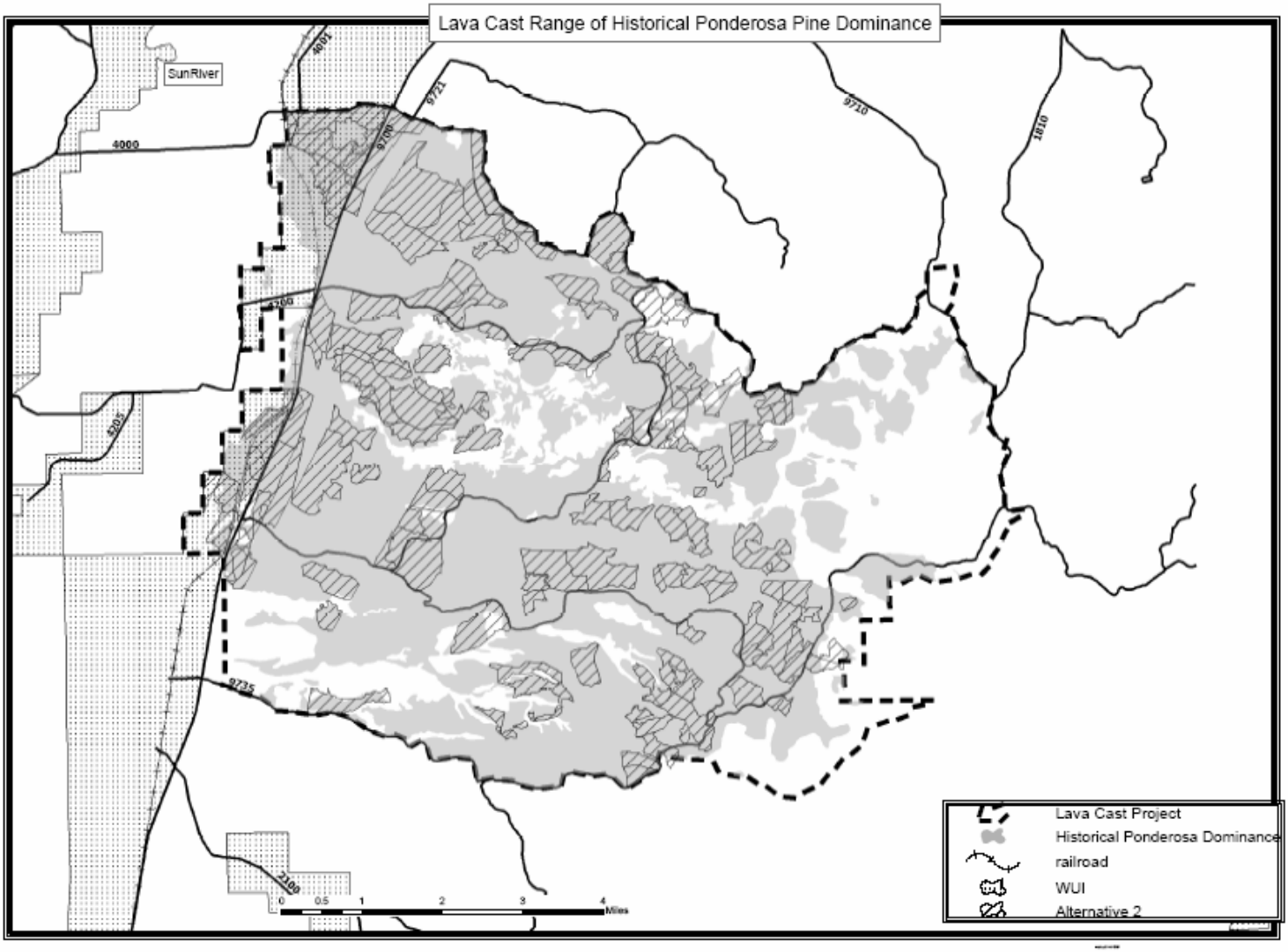
Table 2-9: Historic Range of Variability by Plant Association Group (PAG) and Structure Stage (SS) for Alternatives 2 & 3.

Plant Association Group (PAG)	Structure Stage	SS	HRV Range	Alt. 2 & 3
Lodgepole Dry (LPD)	Stand Initiation	1	16-48%	14%
	Stem Exclusion Closed Canopy	3	1-28%	17%
	Understory Reinitiation	4	11-20%	55%
	Multi-story without Large Trees	5	4-31%	11%
	Multi-story with Large Trees	6	4-10%	2%
	Single-story with Large Trees	7	16-48%	<1%
Mixed Conifer Dry (MCD)	Stand Initiation	1	7-18%	9%
	Stem Exclusion Closed Canopy	3	5-51%	39%
	Understory Reinitiation	4	5-11%	22%
	Multi-story without Large Trees	5	6-48%	43%
	Multi-story with Large Trees	6	5-27%	18%
	Single-story with Large Trees	7	5-15%	5%
Ponderosa pine dry (PPD) & ponderosa pine wet (PPW)	Stand Initiation	1	0-13%	2%
	Stem Exclusion Closed Canopy	3	2-14%	7%
	Understory Reinitiation	4	2-19%	7%
	Multi-story without Large Trees	5	4-31%	63%
	Multi-story with Large Trees	6	5-30%	19%
	Single-story with Large Trees	7	20-60%	1%

Table 2-10: Harvest prescriptions (Rx) comparison by alternative.

Commercial Harvest Prescription	Definition	Alternative 2 acres	Alternative 3 acres
1	Thin mixed stands of ponderosa and lodgepole pine by removing lodgepole pine.	229	229
2	Thin from below to 60 square. feet of basal area per acre. This will generally retain approximately 40 to 90 trees per acre.	6,860	
3	Thin from below to 40 square feet of basal area per acre. This will generally retain approximately 30 to 50 trees per acre.	807	
8	Thin from below to 60 basal area per acre. Where mistletoe is present, reduce mistletoe infection by removing trees with the heaviest dwarf mistletoe infection (DMTR≥3). Reduce stocking levels to minimum stocking levels (as low as 20 basal area per acre) to remove trees with DMTR≥4.	1,616	
12	Thin from below to 60 square feet of basal area per acre and remove all lodgepole pine and white fir. This will generally retain approximately 40 to 90 trees per acre with openings less than 4 acres through the stands.		5,361
13	Thin from below to 40 square feet of basal area per acre and remove all lodgepole pine and white fir. This will generally retain approximately 30 to 50 trees per acre with openings less than 4 acres through the stands.		789
18	Thin from below to 60 basal area per acre and remove all lodgepole pine and white fir. Where mistletoe is present, reduce mistletoe infection by removing trees with the heaviest dwarf mistletoe infection (DMTR≥3). Reduce stocking levels to minimum stocking levels (as low as 20 basal area per acre) to remove trees with DMTR≥4.		1,541
19	Thin From below in ponderosa stands to 60 basal area per acre removing lodgepole pine and white fir within 22’ of ponderosa pine under 12” dbh and 30’ of trees greater than 12” dbh. Thin from below lodgepole pine and white fir 80 square feet of basal area per acre.		1,359
	Total Harvest Acres	**9,512**	**9,279**

Figure 2-3: Lava Cast proposed vegetation treatment units overlaying historic ponderosa pine



MANAGEMENT REQUIREMENTS AND MITIGATION MEASURES COMMON TO ACTION ALTERNATIVES

Alternatives are designed to be consistent with the desired condition specified in the Forest Plan and the standards and guidelines contained within. Applicable Forest Plan Standard and Guidelines and Eastside Screens were applied in the design of the alternatives and are not listed here. The following would be applied to reduce potential adverse impacts of Alternative 2 (Proposed Action) and Alternative 3. If implementation or layout problems or opportunities are encountered, the appropriate specialist would be consulted to determine a remedy.

Mitigation measures are specific actions that could be taken to minimize, avoid or eliminate potentially significant impacts on the resources that would be affected by the alternatives, or rectifying the impact by restoring the affected environment (40 CFR 1508.02). The following mitigations and management recommendations were developed to reduce some of the possible

impacts of proposed treatments for either action alternative. Therefore, each mitigation and recommendation would be applied to both action alternatives.

Botany

Unit specific: To avoid weed spread away from road shoulders, the ground based equipment used to do the treatments in those units adjacent to Highway 97 and Forest Road 40 (EA unit #'s 53, 54, 55, 57, 58, 59, 209, 60, 62, 63, 64, 66, 69, 369, 70, 71, 72, 73, 74, 75, 76, 79, 80, 81, 197, and 198), should avoid treating within 75' of Highway 97, and should move into and out of the unit via existing roads (not through the shoulder).

General: Clean all equipment before entering and after leaving National Forest System lands. Remove mud, dirt, and plant parts from project equipment before moving it into project area and before proceeding to the next project.

Any obvious patches of cheatgrass in particular, but including other weed species and sites not previously known to be in the project area, will be avoided by machinery if found and if possible.

For a dust abatement water source, it is suggested to use the site at Benham Falls day-use area, at the end of road 9702. It is relatively free of weeds (it was most recently checked in August 2006, and only reed canary grass and five stalks of bull thistle were found). It would make a suitable site to draw water from without spreading weeds.

Soils

General: Apply appropriate Best Management Practices (BMPs) to all ground-disturbing management activities, as described in General Water Quality Best Management Practices (Pacific Northwest Region, 1988). Specific BMPs commonly used to minimize the effects of road systems fuels and timber management activities on the soil resource are briefly described for this project proposal:

- Use old landings and skidding networks whenever possible. Assure that water control structures are installed and maintained on skid trails that have gradients of 10 percent or more. Ensure erosion control structures are stabilized and working effectively (LRMP SL-1; Timber Management BMP T-16, T-18).
- In all proposed activity areas, locations for new yarding and transportation systems would be designated prior to the logging operations. This includes temporary roads, spur roads, log landings, and primary (main) skid trail networks. (LRMP SL-1 & SL-3; Timber Management BMP T-11, T-14 & T-16).
- *Surface Drainage on Temporary Roads* – minimize the erosive effects of concentrated water and degradation of water quality through the proper design and construction of temporary roads (Road BMP R-7).
- *Road Maintenance* – conduct regular preventive maintenance to avoid deterioration of the road surface and minimize the effects of erosion and sedimentation (Road BMP R-18, R-19).

- Minimize the extent of new soil disturbance from mechanical treatments by implementing appropriate design elements for avoiding or reducing detrimental soil impacts from project activities. The objective being to reduce displacement and compaction damage to soils by limiting the amount of surface area covered by logging facilities, and limiting equipment operations to specified areas and ground conditions. Options include using some or all of the following:

    1) Use existing log landings and skid trail networks (whenever possible) or designate locations for new skid trails and landings.
    2) Maintain spacing of 100 to 150 feet for all primary (main) skid trail routes, except where converging at landings. The Timber Sale Administrator must approve closer spacing due to complex terrain in advance. Main skid trails spaced 100 feet apart limit soil impacts to 11% of the unit area. For the larger activity areas (greater than 40 acres) that can accommodate wider spacing distances, it is recommended that distance between main skid trials be increased to 150 feet to reduce the amount of detrimentally disturbed soil to 7 percent of the unit area (Froehlich, 1981, Garland, 1983). This would reduce the amount of surface area where restoration treatments, such as subsoiling, would be required to mitigate impacts to achieve soil management objectives.
    3) Restrict grapple skidders to designated areas (i.e., roads, landings, designated skid trails) at all times, and limit the amount of traffic from other specialized equipment off designated areas. The use of harvester machines will be authorized to make no more than two equipment passes on any site-specific area to accumulate materials.
    4) Avoid equipment operations during times of the year when soils are extremely dry and subject to excessive soil displacement.
    5) Avoid equipment operations during periods of high soil moisture, as evidenced by equipment tracks that sink deeper than during dry or frozen conditions.
    6) Operate equipment over frozen ground or a sufficient amount of compacted snow to protect mineral soil. Equipment operations should be discontinued when frozen ground begins to thaw or when there is too little compacted snow and equipment begins to cause soil-puddling damage (rutting).
    7) Prevent additional soil impacts in random locations of activity areas, between skid trails and away from landings, by machine piling and burning logging slash on existing log landings and skid trails that already have detrimental soil conditions.

Unit Specific**:**

- *Protect Soils and Water during prescribed burn operations* – A burn plan addressing compliance with all applicable LRMP standards and guidelines and Best Management Practices will be completed before the initiation of prescribed fire treatments in planned activity areas. Prescribed burn plans need to include soil moisture guidelines to minimize the risk of intense fire and adverse impacts to soil and water resources (LRMP SL-1 & SL-3; Timber BMP T-2, T-3 & T-13; Fuels Management BMP F-2, F-3).

- *Coarse Woody Debris/Down Wood* - Retain adequate supplies of coarse woody debris (greater than 3-inches in diameter) to provide organic matter reservoirs for nutrient

cycling following the completion of all project activities (LRMP SL-1). It is recommended that a minimum of 5 to 10 tons per acre of CWD be retained on Ponderosa Pine sites, and 10 to 15 tons of CWD per acre should be retained on mixed conifer and lodgepole pine sites to help maintain long-term site productivity. These amounts are less than the recommended levels for wildlife habitat objectives (EA pages 38-39).

With the objective to reduce the extent of detrimentally disturbed soil to meet management objectives and to restore and stabilize detrimentally disturbed soils prior to seasonal runoff events, the following is designed to rectify impacts to the soil resource by reducing cumulative levels of detrimental soil conditions that are expected to exceed Regional and LRMP standards and guidelines.

Reclaim specific segments of local system roads, all temporary roads, and some log landings and primary (main) skid trails by applying appropriate rehabilitation treatments in activity areas where detrimental soil conditions are expected to exceed the Regional Policy guidelines. Decommission (obliterate) logging facilities that will not be needed for future management. Options for mitigating the effects of project activities include the use of subsoiling equipment to loosen compacted soils on temporary roads and logging facilities, redistributing humus-enriched topsoil in areas of soil displacement damage, and pulling available slash and woody materials over the treated surface to establish effective ground cover protection.

Reclaim all temporary roads and some of the logging facilities in portions of the following activity areas, ranging in size from 4 to 333 acres, which are expected to exceed allowable limits of detrimental soil conditions following the mechanical treatments proposed with this project:

EA Units: 17, 18, 19, 20, 21, 22, 25, 26, 28, 30, 31, 32, 66, 82, 85, 111, 114, 115, 118, 119, 121, 122, 123, 127, 128, 132, 133, 134, 136, 137, 138, 139, 140, 141, 142, 143, 150, 151, 154, 155, 164, 166, 167, 169, 170, 171, 172, 173, 174, 177, 178, 180, 182, 184, 185, 187, 191, 192, 193, 194, 195, 222, 244, 245, 246, 249, 250, 251, 256, 259, 261, 262, 263, 264, 266, 270, 271, 272, 273, 274, 275, 279, and 380. Note: Harvest numbers above apply to both action alternatives with the exception of EA unit 390 which applies to Alternative 3 only.

Road Specific: Road Decommissioning (subsoiling): Units 170 (0.3 miles), and 252 (0.8 miles).

Fire

Measures taken to reduce the fire effects and smoke emissions prior to underburning in ponderosa pine units are fuel reduction and arrangement done by thinning, whole tree yarding, down woody material, pre-commercial thinning (removal of ladder fuels), and mechanical mowing of shrubs. Monitoring of fuel type and quantity, fuel moistures, air temp, wind direction and lighting pattern are done to meet parameters outlined in the prescribed burn plan designed to achieve desirable objectives and avoid negative effects.

To meet Oregon State Smoke Management specifications for burning, the burn plan prescription is input in the analysis tool “Consume”. If this and other Oregon State Smoke

Management specifications are not met on burn day, burning does not commence until prescribed conditions can be attained.

Burning will be prescribed under northwest to west wind conditions to disperse smoke away from urban areas. Night inversions could create stagnate smoke along Highway 97. In this case, certified highway road guards with visible warning signs will be established to notify drivers on Highway 97 of conditions.

Units will be either thinned, mechanical shrub treated or a combination with handpiling, grapple piling and burning. Handpile burning is done during the fall after a fire season ending weather event and also during the winter. This is done in accordance with Oregon Smoke Management instructions.

Wildlife

LOS/Early and Mid Seral Habitat
Maintain a 25-50 foot buffer around all rock outcrops and logs associated with natural fuels treatments. ***Exceptions*** would be the following units adjacent to lava flows that contain noticeable and valuable aspen and willow stands: Units 145-148,153, 154, 157, 159; underburning aspen and willow associate will help stimulate new growth. Units 162 and 242 would also be exempt from this measure because rock outcrops are not a unique feature but found throughout these units. This measure would completely preclude the use of underburning in these units.

Big Game
Place a minimum 300-foot no treatment buffers around guzzler located in/adjacent to units 130, 131.

The following EA units are within Biological Transition Range. To offset the loss of hiding cover in these areas, 10% of the units will be retained in untreated clumps, one half acre and larger, dispersed throughout the unit. The units are as follows:

Alternative 2: 17-21, 28, 45, 56, 57, 62, 66, 69, 70, 71, 72, 73-83, 85, 86, 106-109, 111, 112, 113, 114, 115, 117-147, 150-152, 154-158, 160-164, 166, 167, 170, 192, 196, 197, 198, 214, 222, 223, 227, 242, 246, 247-253, 256, 257, 259-267, 269, 270, 275-280
Alternative 3: 17-21, 28, 45, 56, 57, 62, 66, 71,73-83, 85, 86, 106-109, 111, 112, 114, 117-147, 150-152, 154-158, 160-164, 167, 170, 192, 196, 197, 198, 214, 222, 223, 227, 242, 246, 247-253, 256, 257, 259-267, 269, 270, 275-280, 369, 380, 382, 385. Some units are within past treatment areas where retention clumps were designated. In these areas use the residual designated clumps to meet this mitigation measure.

Dead Wood: Snags, CWM, GTRs
To provide for primary and secondary cavity nesters as well as coarse wood dependent mammalian species such as American marten and a variety of rodents, maintenance of snags, CWM, and GTRs are needed. The snags and CWM can be randomly distributed over the unit, in clumps, singles, and not met in every acre but totaled for the combined acreage. Where units

are deficient in coarse woody material, an average of 1 slash pile (approximately 100 sq. feet) or concentration (approximately 200 sq. feet) per acre would be retained to supplement qualifying logs (LRMP WL-73) these would be signed to ensure they are retained. Some units will not have machine piling or hand piling so pile retention would be on a site-specific basis. In defensible space units, if piling occurs piles will not be retained in urban interface boundaries, and will not be left within 200' of defensible roads. Piles will not be left within a 300' view of roads containing scenic views allocations.

Retain all existing snags as supplemental wildlife trees for roosting and foraging except when they pose a hazard, other resource protection, or project logistics (Wildlife and Log Implementation Strategy, LRMP Standard WL-38). Efforts to avoid the potential risk, such as incorporating snags and logs into retention areas, would be included.

Where available retain at least 3-6 logs/acre >12" diameter at the large end and 20-40 lineal feet long in ponderosa pine habitats, at least 15-20 logs per acre >12" diameter at the large end and 100-140 lineal feet in mixed conifer habitat, and at least 15-20 logs per acre >8" diameter at the large end and 120-160 lineal feet in lodgepole pine habitats (units: 144, 157, 161, 173 & 176; total of 341 acres. Eastside Screens Direction).

Where fuels treatment is dependent on whole tree yarding and/or grapple piling, these units will be reviewed by Fuels and Wildlife specialists post harvest to ensure fuel loadings have been reduced to forest plan standards and guides (S&G) and Screens direction for course woody material (CWM) have been met.

Within all commercial harvest and fuels treatment units develop harvest and fuels treatment prescriptions to retain all existing CWM >8-10" diameter at the large end.

Develop prescribed burn prescriptions to minimize charring of logs (LRMP Standard WL-72). Fire prescription parameters would ensure that consumption will not exceed 3 inches total (1.5 inches per side) of diameter reduction in featured logs (Eastside Screens).

Raptors

To protect nesting raptors and their habitat, any raptor encountered before or during management activities would be reported to a Bend/Ft. Rock wildlife biologist; additional protection may be necessary. New raptor nests found during management activities will be protected from disturbance.

To avoid negative impacts to nesting raptors, prescribed burning must be conducted under wind conditions that do not carry smoke loads to known active nest areas during nesting periods. (See nesting restriction periods below)

Maintaining the forested character of an area at least 300 feet in radius around the nest will protect any new or active osprey and/or red-tailed hawks nest sites. While timber management may occur, maintain an average of at least 4 dominant overstory trees per acre suitable for nest and perch trees; ponderosa pine favored where possible (WL-2).

Any active raptor nest stands found during management activities will be protected from disturbing activities within ¼ mile (1 mile for the use of explosives) of the nest by restricting site disturbing operations during the following periods:

Cooper's hawk	April 15-August 31 (WL-19)
Sharp-shinned	April 15-August 31 (WL-19)
Northern goshawk	March 1-August 31 (WL-3)
Red-tailed hawk	March 1-August 31 (WL-3)
Osprey	April 1-August 31 (WL-3)
Golden Eagle	January 1-August 31 (M3-15)

Close and/or decommission the system roads associated with units that contain hiding cover or cross a designated corridor.

Obliterate the non-system road within goshawk post-fledging area 3040.

Landbirds

For natural fuels units, retain 10% of the unit in untreated islands, 2-10 acres in size, distributed throughout the unit to provide for movement of ground nesting birds as well as maintaining nesting habitat.

Where possible minimize natural fuels and logging operations during spring and early summer (April 15 – August 1) to limit disturbance to nesting birds.

Sale Area Improvement (K-V and BD projects) by Priority

Protect snags, coarse woody material, mature/late structure shrubs and green tree retention patches as described in other portions of this report. This may involve building line around these habitat areas for fuel treatments.

In units where snags were inadvertently lost due to timber sale activities and where deficient, create snags by blasting, saw topping, or by use of bark beetle pheromones to assist in meeting snag requirements.

Leave and sign/mark slash piles where residual coarse woody material does not meet LRMP standards and guidelines after vegetation management activities.

Review the two water guzzlers within the planning area and maintain guzzlers that are not functioning appropriately. If guzzler is out-dated and beyond repair, consider construction of a new guzzler. If guzzler is beyond repair and is not in a productive site, consider removal of the guzzler.

Scenic Resources

The following measures are proposed for harvest units, 53-60, 62, 66, 69, 70-83 (units up to and including 70 are in Alt. 2 only), 85, 86, 158, 196-198, 209, 214, 245, 369, 380 and 382. Furthermore they apply to units within the foreground landscape areas (0-1/2 mile) of primary and secondary scenic and travel corridors, including Highway 97, 40, 42, and Forest Road 9720.

A Landscape Architect shall work closely with the project silviculturist on treatment prescriptions and sample marking guides; specifically in areas where proposed treatment units falls within scenic view allocation areas.

Approximately 80% of the slash generated in the treatment areas should be removed (to be coordinated with other resource specialists) from the immediate foreground landscape area (0-300 feet) and slash piles should be small and not be obvious to the casual forest visitor following post treatment activities.

Clean-up activities for foreground landscape within the proposed treatment units and landings along scenic and travel corridors frequented by the recreating public should be completed within 1 year for Retention, and 2 years for Partial Retention allocation areas as specified under Deschutes National Forest LRMP S & Gs (refer to Deschutes LRMP, MA 9-8, pg. 123 for more detail).

When a prescribed fire is utilized, avoid scorching above 2/3 of the live crown in units located within the Foreground landscape of recreation sites, scenic and travel corridors. Severely damaged and/or burned trees shall be treated and/or removed soon after as part of post treatment activities, within a 1 and 2 year time frame.

Minimize ground disturbance and damage to vegetation in foreground landscape areas seen from scenic and travel corridors.

Slash clean up within scenic and travel corridors should be completed by hand piling. This recommendation is applicable primarily within the immediate foreground landscape area (0-300 feet from roadway).

Flush cut stumps in the proposed units along scenic and travel corridors within the immediate foreground landscape area (0-300 feet from roadway).

Where possible, design and locate skid trails and landing areas at least 300 feet away from scenic and travel corridors. Use parallel (to a travel corridor) skid trails to help reduce visual effect.

Where possible, use cut tree marking (blue paint) to minimize the amount of marking paint visible from recreation sites, scenic and travel corridors. Paint the back side of the tree if leave tree marking is utilized to reduce residual visual effect in the landscape.

Heritage Resources

Twenty known sites that are unevaluated would need to be identified on the ground and avoided by project activities as they are or adjacent to proposed treatments. The location of temporary roads and landing would need to be identified and reviewed by an archaeologist prior to construction of the road or use of the landing. If the road or landing could disturb an eligible or unevaluated site, it would be relocated outside of the area or data recovery would be

developed in consultation with the Oregon State Historic Preservation Office (SHPO) and implemented prior to the road construction or landing use. Monitoring of avoidance measures would be conducted both during and after project activities to determine that they were implemented and effective.

Connected Actions Common to Alternatives 2 and 3

1. **Noxious Weed Pulling.** If noxious weeds are found during the monitoring of subsoiled skid trails and landings, weeds would be pulled if the infestation is manageable. Weeds pulled during or after the flowering/fruiting period would be bagged and removed for off-site disposal.

2. **Soil Restoration/Enhancement.** Within units proposed for soil rehabilitation and as funding allows, conduct soil rehabilitation treatments in excess of amounts specified for mitigation. Additional rehabilitation would further reduce the cumulative amount of detrimentally compacted soil within activity areas. This would result in a net improvement in soil quality over a larger portion of the treatment areas.

3. **Connectivity Corridors.** Within the Eastside Screens under section A-2 "Connectivity Corridor Stand Description", it states that within connectivity corridor stands medium to large diameter trees should be common and canopy closures are within the top one-third of site potential. Connectivity corridors were designated in the planning based on this description and where conditions on the ground provide the type of habitat needed. The designated corridors for Lava Cast are 600' wide, which is above the minimum standard of 400' (Eastside Screens). Developed corridors within the planning area provide movement north to south as well as east to west. The corridors link LOS stands as well as the one designated Old Growth Management Area (OGMA) a minimum of 2 directions (Eastside Screens Standard). Many of the corridors are within the mid-structural stage (SS5) lodgepole pine, ponderosa pine, and mixed conifer because that was the best available habitat.

Alternatives Considered But Eliminated from Detailed Study

Several ideas and comments were considered during the environmental analysis process. Not all were carried forward for detailed analysis because preliminary evaluation indicated they would not meet the purpose and need of the proposed action or would not be a substantial change from either Alternative 2 or 3. They are briefly described below.

<u>Lava Cast original Proposed Action</u>
The original proposal that was mailed in the scoping letter in May of 2004 is not the same that is proposed in Alternative 2 of this EA. Following review of the initial public scoping comments, it was decided to develop separate projects to reduce the complexity of the original proposal. Subsequently, the Bend-Fort Rock District Ranger decided to move forward with two categorical exclusion (CE) projects. The Lava Cast Timber Stand Improvement Project (non-commercial thinning to reduce stand density, mistletoe and shrub fuels on 804 acres) and the Lava Cast Fuels Reduction Project CEs (mechanical treatment and prescribed burning on

2,193 acres, 847 of which are WUI) were designed from some of the units and treatments proposed in the original Lava Cast scoping letter, and so dropped from detailed consideration for this project. The planning for these two CEs was completed in 2005. Implementation for these projects is scheduled to begin in 2007.

Thin only stands over 200 SDI (Stand Density Index)

One comment suggested thinning only trees which were currently infected or at least treat only stands where the stand density index was 200 or above. This was not analyzed in detail because it does not meet the purpose and need of moving the ponderosa stands to historic condition. Also, it would not reduce pine susceptibility to beetles or fire, nor will the stands grow to ponderosa pine dominance. Furthermore, it does not reduce all fuels levels, just some of the dead material.

Stand density index (SDI) is a method for measuring relative stand density in a forest stand. Stand density above a certain threshold in ponderosa pine and lodgepole pine makes the stands susceptible to bark beetle attack. This threshold is called the Upper Management Zone (UMZ). A ponderosa pine study published by Cochran (1994) involved a stand that was dominated by higher site productivity than the ponderosa pine stands found in the Lava Cast planning area. In this study the conclusion was that stands above 200 SDI were susceptible to beetle infestation. Within the papers presented by Cochran (1994) and Booser and White, a methodology to calculate the UMZ for local stands was presented. This methodology was used with site specific data from the Lava Cast area and from the Plant Association Guide of the central Oregon pumice zone (Volland 1985). The calculations for the Lava Cast area found UMZs lower than 200 SDI. As such, thinning only stands that are over 200 SDI would not reduce or eliminate the risk of beetle attack in this planning area.

Table 2-11: Calculated Plant Association Upper Management Zones

Plant Association	Plant Association Description	Upper Management Zone *ponderosa pine*
CPS2-11	Ponderosa pine/ bitterbrush/ fescue	160
CPS2-12	Ponderosa pine/ bitterbrush/ needlegrass	160
CPS2-13	Ponderosa pine/ bitterbrush-manzanita/ needlegrass	130
CPS2-17	Ponderosa Pine/ bitterbrush-Manzanita/ fescue	150
CPS3-11	Ponderosa / bitterbrush- snowbrush/ needlegrass	170
CPS3-14	Ponderosa pine/ bitterbrush- snowbrush/ fescue	180
CWS1-12	Mixed Conifer/ snowbrush-manzanita	200
CLS2-11	Lodgepole pine/ bitterbrush/ needlegrass	110
CLS2-14	Lodgepole pine/ bitterbrush/ fescue	140

Thin only trees less than 12" DBH –

This was another suggestion received during scoping that advocated thinning for fuels treatments by only cutting trees less than 12" dbh (diameter breast height). This was not analyzed in detail because it would not meet the purpose and need to move stands towards historic condition of ponderosa pine dominated stands, reduce the risk of loss to bark beetles and reduce the spread of mistletoe. Stands were not selected to only treat fuels in or outside of WUI. They were selected inside and outside the WUI to move them towards ponderosa pine HRV, reduce the risk of loss due to mountain pine beetle and spread of mistletoe.

The need to restore ponderosa pine dominated stands and to reintroduce fire into this fire adapted ecosystem would not be met due to the leaving of lodgepole pine greater than 12" dbh.

Within stands selected for treatment to reduce beetle risk, modeling with the Forest Vegetation Simulator was conducted using a 12" dbh upper cutting limit constraint. The modeling indicates that 21% of the stands would be above the Upper Management Zone making them susceptible to bark beetle infestation. Modeling also indicates 62% of the stands being well above the UMZ stocking level within the first decade following treatment. This type of treatment would result in a short-term fix that in just over a decade another treatment would have to be implemented. Also, even where objectives are seemingly achievable, it must be taken into account that the stocking densities following thinning treatments projected are averages and do not reflect the clumpy nature of stands. Within these areas it is very likely that on about 30% of a stands acreage, residual density objectives would not be achieved with a 12" dbh upper diameter limit, even if the modeling shows an overall achievement based on stand stocking averages.

With many of the stands to be thinned a 12" diameter cut limit would not provide enough space between trees to provide an effective deterrent for the spread of mistletoe.

Modeling with a 21" dbh upper cutting limit, a constraint required by the Eastside Screens, indicate that density reduction objectives can be achieved in almost all stands and densities below the Upper Management Zone can be achieved in all stands.

Proposed Monitoring

Project monitoring includes "implementation monitoring" to assure the selected alternative and mitigation measures are implemented on the ground as designed and achieve the desired results. Monitoring also includes "effectiveness and validation monitoring" to confirm assumptions used for effects analysis.

Item 1 - Scenic Views Monitoring

Objective: To assure objectives are being met for units along Highway 97.

Monitoring Elements: Landing location and skid trail orientation. Understory tree condition.

Type of Monitoring: Implementation.

Methods/Parameters: Visual observations.

Frequency/Duration: Visually survey at the start of harvest activities to assure landings and skid trails are located in desirable locations. Visually survey following harvest

activities to assess extent of damage to understory and initiate treatments to fall damaged trees detracting from visual quality objectives.
Reponsibility: Landscape architect.

Item 2 - Noxious Weed Monitoring
Objective: Prevent establishment or spread of noxious weeds.
Monitoring Elements: Presence of noxious weeds.
Type of Monitoring: Post timber sale.
Methods/Parameters: Subsoiled skid trails and landings.
Frequency/Duration: Visually survey for 2 years following subsoiling.
Responsibility: Botanist.

Item 3 - Temporary Road Monitoring
Objective: To assure that temporary roads are being closed in a timely manner.
Monitoring Elements: Miles of open temporary roads within the Lava Cast planning area.
Type of Monitoring: Implementation monitoring.
Methods/Parameters: Visual observations
Frequency/Duration: Weekly, or as needed, during the life of the timber sale(s).
Responsibility: Timber Sale Administrator.

Item 4 – Fuels Treatment Monitoring
Objective: To determine degree and down wood consumption and snag creation.
Monitoring Elements: Amount of down woody and snags before and after fuels treatment.
Type of Monitoring: Implementation monitoring.
Methods/Parameters: Visual observations
Frequency/Duration: This will generally take place one season after implementation and continue for the next two years.
Responsibility: Wildlife biologist.

Item 5 – Wildlife Clump Monitoring
Objective: To determine wildlife clump development and effectiveness.
Type of Monitoring: Implementation monitoring.
Methods/Parameters: Visual observations
Frequency/Duration: This will be conducted post-commercial and again post-non-commercial treatments.
Responsibility: Wildlife biologist.

Item 6 – Raptor Monitoring
Objective: To determine effects to raptor habitat.
Type of Monitoring: Implementation monitoring.
Methods/Parameters: Visual observations
Frequency/Duration: This will be conducted the season before treatments begin and the nesting after treatments (commercial and non-commercial).
Responsibility: Wildlife biologist.

Item 7 – Stand characteristics Monitoring

Objective: To determine effectiveness of prescription in retaining a patchy distribution and some multi-storied characteristics.

Type of Monitoring: Implementation monitoring.

Methods/Parameters: Visual observations

Frequency/Duration: This will be conducted post-treatment.

Responsibility: Wildlife biologist.

Item 8 – Coarse Woody Material Monitoring

Objective: To determine more exact existing conditions. It will be noted where CWM direction may compete with fuel loading standards and guidelines and objectives of the project.

Type of Monitoring: Implementation monitoring.

Methods/Parameters: Visual observations

Frequency/Duration: This will be conducted prior to treatment.

Responsibility: Wildlife biologist and fuels specialist.

CHAPTER 3

EXISTING CONDITION, AFFECTED ENVIRONMENT and ENVIRONMENTAL CONSEQUENCES

The Existing Condition, Affected Environment and Environmental Consequences (Effects) section provides the scientific and analytical basis for alternative comparison. This section describes the beneficial or adverse impacts to the environment that would occur. Probable effects are discussed in terms of environmental changes from the current condition and include qualitative as well as quantitative assessments of effects. The assessment is related to issues and measures discussed in Chapter 1.

Analysis of effects follows direction outline in a memorandum from the Council on Environmental Quality, *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (June 24, 2005). This memo provides guidance on the extent to which agencies are required to analyze environmental effects of past actions when cumulative effect of the proposal is in accordance with Section 102 of NEPA (National Environmental Policy Act). In summary, review of past actions is required to the extent that it informs the decision maker regarding the proposed action.

The magnitude and duration of potential effects, both physical and biological changes, depend on the intensity of site disturbance, the timing and location of activities, and the inherent properties within affected activity areas. Direct effects occur at essentially the same time and place as the actions that cause disturbance. Indirect effects occur sometime after or some distance away from the initial disturbance. Cumulative effects include all past, present, and reasonably foreseeable actions that cause disturbance to a particular resource.

Specialist reports for Silviculture, Soils, Botany, Wildlife and Range are incorporated by reference. For more detailed and supporting documentation, please refer to these specialist reports. They can be viewed at the Deschutes National Forest website: www.fs.fed.us/r6/centraloregon/projects/units/bendrock/index.shtml or at the Bend-Fort Rock District Ranger's Office located at 1230 N.E. Third Street, Suite A-262, Bend, Oregon. Other resource analysis is documented in this EA and not part of a specialist report.

Specialist reports and analysis are summarized in each resource area effects section. Resource specialists addressed the alternatives and any effects that the proposed actions may have on each respective resource.

PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Past actions in the Lava Cast planning area have been important in the development of the present forest stands. Similar to adjacent planning areas, the Lava Cast area was acquired from the Shevlin-Hixon Company and is composed of predominantly stands 60-80 years old. Under Forest Service ownership these lands have had varying amounts of management.

Lands acquired by the Forest Service in 1944 included 22,584 acres within the Lava Cast planning area (62%). These lands were part of a large 89,000 acre purchase from Shevlin-Hixon Company (Land Acquisition #102). The lands acquired retained on average less than 30 board feet of timber per acre at the time. Thirty board feet of timber is less than the amount scaled from an average 9 inch diameter tree (Meyer, 1999).

When acquired the lands were stocked with ponderosa pine and lodgepole pine seedlings, saplings and some smaller trees, which had little or no value at the time. These stands of trees were grazed by livestock. This limited the number and intensity of fires and the trees were able to grow into dense conditions with little or no natural stocking controls until the 1980's. In the1980's mortality of lodgepole pine dominated stands started to occur. This mortality led to subsequent efforts to manage the wild stands to avoid further loss of trees and timber volume began.

The majority of the area to be treated was in private ownership until 1944. Prior to 1944 the area had contained a logging camp and railroad grades The logging camp known as Shevlin, Cliff or Rim rock camp and railroad grades were active during the late 1920's and early 1930's. In the Lava Cast area the logs were skidded to the railroad grades using tractors or cable systems depending on the slope and ground condition. Skidding to the railroad grade required planning for an average skid distance of ¼ mile or less. Railroad grades were constructed usually ½ mile apart. These railroad grades were later used by trucks and cars and now are a large part of the road system in the forest. There may be areas where horse logging occurred but horses had generally been replaced by mechanized systems by this time. Following logging natural regeneration of ponderosa pine and lodgepole pine successfully stocked the area with trees.

Railroad logging occurred on the Forest Service lands adjacent to Shevlin-Hixon lands at the same time. The Forest Service ownership was left stocked with overstory trees and the cutting was limited to a thinning or at most a seed tree cut. This can be seen by the number of large trees remaining in the Newberry monument, the majority of which has been in Federal ownership since 1905.

The following is a summary of past, ongoing, or reasonably foreseeable actions that, when relevant to this environmental analysis of each resource, were considered for the Lava Cast cumulative effects analysis.

Table 3-1: Past, ongoing, and future foreseeable projects in and adjacent to the Lava Cast planning area.

Project Name	Project Description	Project Status	Acres in Lava Cast Planning area	Total Acres or miles of Project
Fuzzy Environmental Assessment (2000)	Vegetation Management.	Implementation	0	50,701 acres
Improvements to Lava Lands Visitor Center: (2002)	Non-commercial thinning.	Completed 2002	0	38 acres
Lava River Cave	Mistletoe reduction	Completed 2002	0	29 acres
Highway 97 Barriers	Install center barriers near Lava Lands.	Completed 2003	2.0 miles	3.0 miles
18 Fire Salvage EIS	Salvage fire killed trees on 3,810 acres. Close and decommission roads.	Completed 2005	0	2,030 acres
Kelsey Non-Motorized Trail EA.	Construction of a non-motorized trail.	Completed 2003	0	8.4 miles
East Tumbull Planning Area	Vegetation management.	Decision in 2006	0	10, 555 acres
Lava Cast Timber Stand Improvement CE	Pre-commercial thinning, pruning and girdling mistletoe overstory.	Implementation	565 acres	565 acres
Access to Lava Lands Visitor Center/Lava River Caves.	New access from Cottonwood to Lava River Cave; Lava Lands Visitor Center and Benham Falls Picnic Area.	Planning. Implementation in 2008.	0	2.5 miles
Highway 97 Project.	Widening from 2 to 4 lanes.	Implementation 2007.	2.0 miles	2.0 miles
New Cottonwood Road (2 acres) and Sunriver Interchange (16 acres).	Interchanges and road improvement.	Implementation 2005-2007.	18 acres	18 acres
Newberry National Volcanic Monument Wildland Urban Interface Fuels Treatment.	Fuels treatment.	Planning	0	20 acres
Lava Cast Fuels Reduction CE.	Fuels treatment.	Implementation	2,193 acres	2,193 acres
McKay Firewood Area	Public firewood cutting area.	Implementation	3,300 acres	3,300 acres
Managed Mechanized Use Strategy	Assess motorized travel.	Planning	Entire project area.	Entire project area.
Tract C Land Conveyance	Land exchange.	Implementation	0	910 acres
Upper Deschutes Wildfire Protection Plan.	Fuels treatments.	Completed	0	250 acres
		Planning		100-120 acres
Sunriver Community Wildfire Protection Plan projects	Six year cyclical fuels treatment.	Implementation every 6 years.	0	3,374 acres
	Fuels treatments.	Planning		80-100 acres

FOREST VEGETATIVE CONDITIONS (Silviculture)

Scope of the Analysis

Stands were selected for treatment that would move them toward HRV in the ponderosa pine and mixed conifer dry plant association which historically was dominated by ponderosa pine. Stands were then selected to treat based on the amount of ponderosa pine currently present and whether it was capable of becoming the dominant species with management. Finally disease and stocking levels were considered. Stands were selected for treatment if stocking levels were above the threshold for susceptibility to beetle infestation. If stands had levels of mistletoe which exceeded manageable thresholds they were not selected for treatment.

The current forest species, size and age structure (structural stages) was identified using 1995 aerial photos and the data from the Forest-wide vegetation mapping project from 2000 on the Deschutes National Forest. This project identified homogenous stands and features of those stands producing a database for the entire forest. Using these data and developing models to identify the structural components of age classes (cohorts), tree size and trees per acre, estimates were made for current structural stages. Corrections for more recent actions adjusted these estimates. Further analysis developed structural stages for large tree lodgepole pine stands that provided an estimate of late old structure (LOS; Structural Stage 6 & 7).

Two methods of estimating historic condition were conducted for the Lava Cast project. General Land Office Cadastral surveys from the La Pine basin and stand modeling were used using a large landscape where forest types, environmental settings and disturbance regimes are relatively uniform. The eastside of the LaPine basin from north of the planning area to the private land in the south was the geographic area described below.

Stands that have mistletoe infected overstory that does not exceed manageable thresholds were identified and selected as well to reduce its effect on forest health, especially of ponderosa pine stands. These stands were selected in order to treat conditions that would if untreated not allow them to grow into healthy stands of large trees.

Affected Environment and Existing Conditions

Precommercial thinning and commercial thinning have taken place throughout the planning area. Some areas have received both treatments. The largest decade of thinning treatments occurred during the 1980's and included 15,027 acres of thinning within the planning area. Other stands in the area have received no management treatments since they were logged in the 1930's. Of the proposed treatment units, 4,764 acres have had no active stand management since establishment following railroad logging. Thinning has occurred on an estimated 5,286 acres of the proposed units.

Removal of seed trees left from previous harvest activities have occurred in the planning area that have resulted in the current plantations. Many of the remaining overstory trees are infected with mistletoe that is infecting the understory.

Currently the ponderosa pine stands are dominated by 80-year-old ponderosa pine with lodgepole pine and in a few places white fir. The stands tend to be dense stands of poles with heavy fuels from beetle mortality. The fuels are mostly lodgepole pine from previous infestations; however ponderosa pine mortality is becoming more common due to tree stress. Managed stands of ponderosa pine have been precommercially or commercially thinned and are now 60 to 130 square feet of basal area. These stands have responded to lower stocking levels with increased growth, crown volume and understory tree and brush establishment. The release favors brush and typically lodgepole pine seedlings. The brush is bitterbrush in lower elevations transitioning to ceanothus and manzanita in upper elevations. Historically the understory was comprised of low stocking of brush and seedlings due to frequent fires reducing seed sources for brush and fire intolerant tree species. These frequent fire stands had forbs and grasses dominating the understory vegetation.

Currently the stands in the lodgepole pine zone at lower elevations are mixed lodgepole pine and ponderosa pine, both pole and medium sized trees. Pole size trees about 60 – 80 years old dominate the lodgepole pine in the area. There are very few stands that are pure lodgepole pine. The densities in unmanaged stands are very high, putting them at risk to bark beetle infestation. Surface fuels in these stands have high fire hazard due to lodgepole pine mortality caused by mountain pine beetle. Stands in this area, which have been managed, are thinned stands or seed tree regeneration stands. The thinning favored leaving ponderosa pine, which now dominate the stands. The surface fuels are composed of bitterbrush in heights of 12 – 24 inches. Regeneration of lodgepole pine has become established under most of the thinned stands. Seed tree regenerated stands have overstory seed trees of lodgepole pine and some ponderosa pine remaining. These units are all adequately stocked with lodgepole and ponderosa pine. Many of the lodgepole pine seed trees are infected with dwarf mistletoe.

The lodgepole pine in higher elevations stands was typically a monoculture of lodgepole pine. These stands dominated by lodgepole pine have few other species associated through development. Currently these are dense pole stands with heavy fuels from mountain pine beetle mortality. There are stands in this area that have been regenerated with seed tree cuts and currently have regeneration underneath with overstory lodgepole pine seed trees. The overstory is typically infected with mistletoe.

On the east side of the planning area, much of the wildlife connectivity corridors exist within forested stringers of mid to late seral mixed conifer and lodgepole pine. As you move to the western side of the planning area to lower elevations, the plant association changes to ponderosa pine where some of the connectivity exists in late seral ponderosa pine but the majority of it is mid seral or “black bark” ponderosa pine. There are several buttes with steep slopes and many stands of forested lava (i.e. old lava flows with trees growing on them), much of these areas contain the residual stands of late seral ponderosa pine. These corridors provide key linkages of not only big game habitat but also late and old structure habitat (LOS) or closed canopied forest and those species associated with this habitat (e.g. forest hawks, marten).

All of the LOS is of small patch sizes ranging from 1-100 acres, with most being 30 acres or less. Most of these patches are not large enough to encompass home ranges for the species associated with LOS. Late Seral conditions are limited throughout the planning area. There

are approximately 32,000 acres of forested vegetative conditions within the planning area, of which 1,420 acres are classified as LOS (approximately 4% of the planning area).

Figure 3-1: Unmanaged stand in the Lava Cast planning area.

Figure 3-2 Managed stand in Lava Cast planning area.

Comparison of Current and Historic Conditions

Comparison of historical conditions and current conditions in general shows low current levels of LOS and high levels of younger structural conditions. Specifically, all plant associations show very low current levels of multi stratum with large trees and single stratum with large trees compared to historic conditions. This is expected given the extensive logging which occurred on the private lands in the 1920s and 1930s. This has allowed understory reinitiation and for ponderosa pine development of multi-strata without large trees. Both of these stages are dominated by "black bark" stands of ponderosa 60 to 80 years old, and lodgepole pine. These stands have the potential to become late old structure stands if they are not set back to younger structures with disturbance events of fire or high insect mortality. Only the lodgepole pine plant association exhibits a low level of stand initiation structure. This is assumed to be due to the lack of stand replacement fire in the lodgepole pine plant associations for the last 60-80 years.

Table 3-2: Current Structural Stages by Plant Association Group (PAG). (There is no SS 2 in the planning area.)

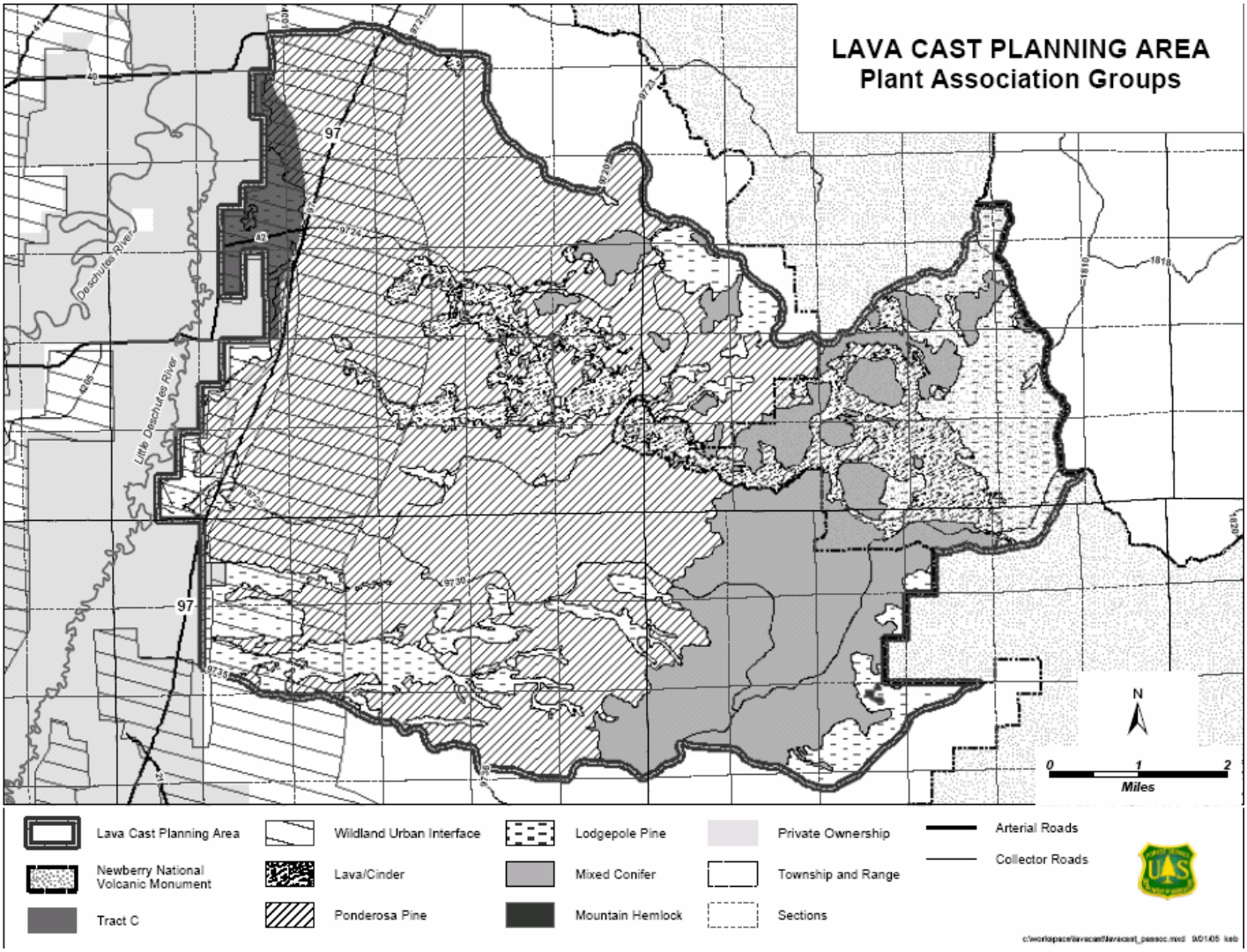
Plant Association Group / Structural Stage	Ponderosa Pine[1]		Lodgepole pine		Mixed Conifer		Lava/ Cinder[2]	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Stand Initiation	1,397	7%	852	13%	465	7%	0	0%
Stem Exclusion Open Canopy	0	0%		0%	0	0%	3,841	98%
Stem Exclusion: Closed Canopy	2,749	14%	1,300	20%	2,540	39%	14	< .5 %
Understory Re-initiation	8,627	43%	3,361	51%	1,627	25%	31	< 1%
Multi Stratum without Large Trees	6,412	32%	916	14%	1,347	21%	38	1%
Multi Stratum with Large Trees	475	2%	165	2%[3]	340	5%	4	0%
Single Stratum with Large Trees	212	1%	36	< 1%	150	2%	2	0%
Totals	19,872	100%	6,622	100%	6,469	100%	3,920	100%

[1] Includes ponderosa pine wet and dry which have little ecotonal difference

[2] Lava and Cinder Stand reinitiation reflects the open flows and unstocked / unstockable areas of the areas.

[3] Includes what is defined as lodgepole oldgrowth

Figure 3-3: Lava Cast Planning Area Plant Association Groups (PAG).



Historic Structure Determination

Use of historic conditions as a basis for comparison assumes vegetative and wildlife populations were viable and sustainable across the landscape. Historic records, fire-scarred stumps and tree ages were used to gather information to estimate historic conditions. While such an approach may not be perfect, it was chosen to approximate past conditions, allowing comparison between historic and present conditions, and to estimate the desired conditions that might reasonably be expected to maintain a sustainable, viable ecosystem (Regional Forester's Forest Plan Amendment #2 1995).

Table 3-3: Historic Range of Variability (HRV) based on 1869, 1880 & 1882 Cadastral Survey and VDDT Modeling.

Structural Stage	SS	Proportion of Survey Transects in Area by PAG			Historic Range of Variability Historical condition& Modeling		
		PPD	LPD	MCD	PPD	LPD	MCD
Stand Initiation	1	13%	16%	18%	0-13%	16-48%	7-18%
Stem Exclusion Closed Canopy	3	14%	1-28%	9-51%	2-14%	1-28%	5-51%
Understory Reinitiation	4	13-19%	16-20%	5-11%	2-19%	11-20%	5-11%
Multi-story without Large Trees	5	6-17%	4-31%	6-48%	4-31%	4-31%	6-48%
Multi-story with Large Trees	6	5%	4%	5%	5-30%	4-10%	5-27%
Single-story with Large Trees	7	52%	32%	15%	20-60%	0-32%	5-15%

The following table is a brief description of structural stages used for analyzing HRV and comparing existing conditions with historic conditions.

Table 3-4: Structural Stage Descriptions.

STRUCTURAL STAGE	CODE	DESCRIPTION
Stand Initiation	SS1	One canopy stratum (may be broken or continuous), on dominant cohort of seedlings or saplings. Grass, forbs or shrubs may be present with seral trees.
Stem Exclusion: Open Canopy	SS2	One discontinuous canopy stratum. One cohort of tree stems excluding competition. Trees may be poles of small or medium diameter. Understory shrubs, grasses, or forbs may be present.
Stem Exclusion: Closed Canopy	SS3	Canopy layer is closed and continuous. One or more canopy strata may be present. Lower canopy strata, if present, is the same age as the upper stratum. Trees may be poles or small or medium diameter. Understory shrubs, grasses, or forbs may be present.
Understory Re-initiation	SS4	The overstory canopy is discontinuous. Two or more canopy layers are present. Overstory trees may be poles or of small or medium diameter. Understory trees are seedlings or poles.
Multi-stratum without Large Trees	SS5	The overstory canopy is discontinuous. Two or more canopy layers are present. Large trees are uncommon in the overstory. Horizontal and vertical stand structure and tree sizes are diverse. The stand may be a mix of seedlings, saplings, poles, or small or medium diameter trees.
Multi-stratum with Large Trees	SS6	The overstory is broken or discontinuous. Two or more canopy layers are present. Medium and large sized trees dominate the overstory. Trees of all sizes may be present. Horizontal and vertical stand structure and tree sizes are diverse.
Single Stratum with Large Trees	SS7	The single dominant stratum consists of medium sized or large trees. One or more cohort of trees may be present. An understory may be absent or consist of sparse or clumpy seedlings or saplings. Grasses, forbs, or shrubs may be present.

EFFECTS

Historic Range of Variability

Alternative 1 - No Action

In the short term (5 to 10 years) there would be no change in the stand structure with the No Action alternative. In the long term (50 to 100 years) the structure would change from a closed canopy stem exclusion (SS 3) to understory reinitiation similar to the action alternatives. However the diameter size class of the largest trees would be smaller than they are currently. This is because in the dense stands (stem exclusion structure stage) would have large areas of mortality from mountain pine beetle infestation. This would affect more than 4,000 acres in the lodgepole and ponderosa pine plant association groups. In the mixed conifer plant association groups there is more than 2,400 acres of structure stage 3, however only a portion of it is dominated by ponderosa pine and lodgepole pine. In the long term stands have the potential to grow into late old structure though overstocking and beetle mortality has the potential to reduce the growth and average stand diameters as the stands mature. (See Table 3-4)

Alternatives 2 & 3

Prescriptions are to thin from below by removing the smallest diameter and least fire resistant species first. The average stand diameter within treatment units is 7 inches in diameter. Through computer modeling it is estimated that following the treatments alternative 2 on average result in 12 inches average stand diameters and alternative 3 on average would have 14 inches stand diameter. The action alternatives would have treatments where no previous activities have taken place since the stands were established; for alternative 2, approximately 4,764 acres and in alternative 3 approximately 4,715 acres. Through thinning these stands would have larger average diameters, be less susceptible to fire mortality with higher crown height, lower surface fuel accumulation, and less inter-tree stress.

The assumptions made for the changes of structural stages were that the thinning treatments would convert stands (which had small diameter cohorts, or were dominated by pole and medium sized trees) to the understory reinitiation stage. The thinning from below results in a more open canopy that is similar to that caused by disturbance agents (i.e., fire, insects and disease). Thinning from below would also reduce stand density by removing the majority of understory trees. In the late old structure stands removal by thinning from below reduces the smallest tree size classes but leaves the middle and oldest tree size classes. Thus thinning from below does not change the structural stage of the late old structure stands.

Another difference between alternative 2 and 3 is the thinning of LOS stands. In Alternative 2 there is a total of 558 acres of LOS thinned. This thinning keeps the large trees in a healthy, open condition and would move to a more open condition as younger trees grow large in the next century. Alternative 3 does not treat many LOS stands within the area of Eastside screens. Alternative 3 has understory thinning and fuels treatments on up to 200 acres of LOS in units. Without thinning of understory trees large trees can be expected to have increased mortality rates from competition and western pine beetle mortality. Table 3-4 displays the

current structural stage HRV, and what is expected following implementation of the action alternatives.

Growth analysis predicts a difference in average stand diameters from untreated and treated stands after 20 years of growth displayed in Table 3-6**.**

Table 3-5: After treatment twenty year average stand diameter estimates for units before and after thinning.

Prescriptions Rx	Average Diameter	Minimum avg. Diameter	Maximum avg. Diameter
Untreated	9”	4”	18”
Alternative 2: Rx 1, 2, 3 & 8	16”	9”	24”
Alternative 3: Rx 1, 12, 13, 18 & 19	18”	9”	26”

Table 3-6: Structure stage, HRV, current condition and expected level with Alternatives 2 & 3.

Plant Association Group (PAG)	Structure Stage	SS	HRV Range	Current & Alt 1	Alt 2 & 3
Lodgepole Dry (LPD)	Stand Initiation	1	16-48%	13%	14%
	Stem Exclusion Closed Canopy	3	1-28%	20%	17%
	Understory Reinitiation	4	11-20%	51%	55%
	Multi-story without Large Trees	5	4-31%	14%	11%
	Multi-story with Large Trees	6	4-10%	2%	2%
	Single-story with Large Trees	7	16-48%	<1%	<1%
Mixed Conifer Dry (MCD)	Stand Initiation	1	7-18%	7%	9%
	Stem Exclusion Closed Canopy	3	5-51%	39%	22%
	Understory Reinitiation	4	5-11%	25%	43%
	Multi-story without Large Trees	5	6-48%	21%	18%
	Multi-story with Large Trees	6	5-27%	5%	5%
	Single-story with Large Trees	7	5-15%	2%	2%
Ponderosa pine dry (PPD) & ponderosa pine wet (PPW)	Stand Initiation	1	0-13%	7%	7%
	Stem Exclusion Closed Canopy	3	2-14%	14%	7%
	Understory Reinitiation	4	2-19%	43%	63%
	Multi-story without Large Trees	5	4-31%	32%	19%
	Multi-story with Large Trees	6	5-30%	2%	2%
	Single-story with Large Trees	7	20-60%	1%	1%

Acres displayed for treatments are gross unit acres. Gross acres will be reduced for wildlife leave areas and protection of other resources. Over the planning area where ponderosa pine historically dominated there are close to 6,000 acres of stands now dominated by white fir and lodgepole pine. Within the plant associations which are historically ponderosa pine but are mixed conifer sites without disturbance, alternative 2 proposes to treat 851 acres and alternative 3, 800 acres. Alternative 2 moves these stands towards ponderosa pine dominance though they retain white fir and lodgepole pine to maintain full stocking in the stands. Alternative 3 proposes to remove lodgepole pine and white fir from 449 acres in these mixed conifer sites. Alternative 3 maintains white fir and lodgepole pine on 351 acres in the mixed

conifer plant associations, whereas Alternative 2 maintains it on all treated acres. Retaining more lodgepole pine and white fir would occur in Alternative two by having them spread throughout the treatment unit; Alternative 3 would keep dense clumps with more open space where ponderosa pine dominates.

Stands which are currently dominated or co-dominated by lodgepole pine or white fir in historical ponderosa pine dominated areas is changed by both action alternatives. Alternative 2 proposes to treat approximately 1,759 acres which currently have ponderosa pine sharing dominance with white fir or lodgepole pine. Treatments favor the retention of ponderosa pine though it would not completely remove the other species. Favoring the ponderosa pine moves the stands towards ponderosa pine dominance and HRV. Alternative 3 treats approximately 2,033 acres which currently have white fir or lodgepole pine dominance or co-dominance. It removes lodgepole pine and white fir from approximately 1,100 acres. Approximately 900 acres of white fir and lodgepole pine would be retained in clumps. The stands which have removal of lodgepole pine and white fir are very similar to historical conditions, with lodgepole pine and white fir absent from most of the stands yet occurring in places left for wildlife clumps. For each alternative, the largest diameter trees would not be removed. Alternatives 2 and 3 move the stands toward more ponderosa pine dominance (HRV) and reduce the lodgepole and white fir co-dominance and dominance on 29% and 34% respectively of the stands currently dominated or co-dominated by the other species.

Dwarf Mistletoe

Mistletoe affects the health of trees with higher rates of mortality and increased susceptibility to other forest pests such as root rots and bark beetles. Ponderosa pine trees infected with mistletoe tend to have higher mortally rates in fires. The higher mortality rates are attributed to increased stress on the trees, increase crown densities in the lower branches and increased surface fuels beneath the trees (Conklin & Armstrong, 2001). Because there are numerous insects associated with dwarf mistletoes that provide food for many bird species, it is assumed the large infected trees have the greatest ecological value. The large trees with mistletoe typically did not always have mistletoe. Large old trees typically would have grown towards maturity and then gotten an infection. The infection in a mature tree can spread throughout the crown since there is little height growth. Younger trees with mistletoe will not typically grow very old with mistletoe infections. Though if young trees are fast growing they may grow ahead of the mistletoe infection, but once the tree growth slows the mistletoe will infect the top branches and start to weaken the tree making it susceptible to other causes of mortality due to stress.

With all action alternatives, reduction of mistletoe overstory occurs with the implementation of the previously planned and decided Lava Cast TSI CE. This would reduce overstory mistletoe through girdling, pruning or felling of overstory trees on 585 acres of regeneration units. These acres are not part of this project.

Alternative 1 - No Action

No action would allow mistletoe infection to continue at a higher rate than was common on the pre-euro-American landscape. Mistletoe abundance in the overstory is the primary

contributing factor to mistletoe increase in the Lava Cast area. Mistletoe will continue to spread and cause understory infection which would increase the level of mistletoe and mortality in stands with moderate to heavy infection. Stands which have moderate or low mistletoe ratings coupled with bark beetle mortality can be expected to be high infection areas within a few decades.

Other effects include the thinning and overstory removal included in the Lava Cast TSI CE. This will reduce stands with overstory mistletoe on 585 acres. This reduction would not impact the stands which would be treated in this proposed action however it would reduce the overall mistletoe infection in the planning area. Adjacent treatments in the Long Prairie planning area also reduce overstory mistletoe. Total reductions in overstory mistletoe will not reduce the level of mistletoe infection in the area or on the District below what occurred historically. The level of infection would continue to be higher than was common on the pre-European landscape.

Alternatives 2 & 3

Removal of the majority of infections in lightly infected stands will reduce the level of infection within stands and increase space between trees (i.e. reduce stand density). Stands which have low infection levels and have prescriptions 8 and 18 (see Table 2-10) remove the majority of identified mistletoe. These prescriptions cover approximately 1,616 acres in Alternative 2 and 1,541 acres in Alternative 3. Both alternatives reduce the level of infection and spread within stands but would not eliminate it. Thinning of mistletoe infected trees in ponderosa pine opens the stand allowing the trees to grow faster than the spread of the mistletoe in the stand. This allows trees to grow large in size and to maturity with less chance of mortality due to mistletoe and other stresses.

Bark Beetle Risk

A Stand Density Index (SDI) where stands are susceptible to bark beetles or developing a suppressed class of trees is considered the upper management zone (UMZ). This is also the upper site potential for cover calculations. Within the Deschutes Forest Plan connectivity corridors are to be maintained in the upper 1/3 rd of site potential. Two thirds of the site potential is also typically calculated as the lower management zone (LMZ) since it maintains a stocked condition to capture a significant portion of the site resources in tree growth (Cochran et al 1994). Calculations for the upper management zone (SDI) where stands are susceptible to bark beetles or developing a suppressed class of trees were made by Barbara Schroeder, Bend-Fort Rock Silviculturist, following methodology of Booser. Below in Table 3-7, are the calculated SDI upper management zones for plant associations which are proposed to be treated in Lava Cast planning area.

Table 3-7 Calculated Plant Association Upper Management Zones

Plant Association	Plant Association Description	Upper Management Zone *ponderosa pine*	Lower Management Zone / Basal Area Ranges[4]
CPS2-11	Ponderosa pine/ bitterbrush/ fescue	160	107/ 54-65
CPS2-12	Ponderosa pine/ bitterbrush/ needlegrass	160	107/ 54-65
CPS2-13	Ponderosa pine/ bitterbrush-manzanita/ needlegrass	130	87/ 44-53
CPS2-17	Ponderosa Pine/ bitterbrush-Manzanita/ fescue	150	101/ 51-61
CPS3-11	Ponderosa / bitterbrush-snowbrush/ needlegrass	170	114/ 57-69
CPS3-14	Ponderosa pine/ bitterbrush-snowbrush/ fescue	180	121/ 61-73
CWS1-12	Mixed Conifer/ snowbrush-manzanita	200	134/ 67-81
CLS2-11	Lodgepole pine/ bitterbrush/ needlegrass	110	74/ 37-45
CLS2-14	Lodgepole pine/ bitterbrush/ fescue	140	94/ 47-57

Alternative 1 - No Action

Loss of growth, increased fuels hazard, an increase in mortality of large trees, reduced LOS recruitment and declining forest health are expected in stands which have been identified as susceptible to bark beetle infestation. Stand densities that stress forest vegetation and that increase risk to bark beetle attack would not be reduced by this alternative and would remain high on approximately 17,000 acres (52% of the area). However, growth of trees would cause a relative increase in density and inter-tree competition in stands which are presently below the Upper Management Zone (UMZ). Beetle caused mortality reduces stand density but would also kill a greater proportion of medium and large trees within stands. This would reduce the number of stands which progress from understory reinitiation and stem exclusion stages into the LOS stages. Another result would be these stands having increased fuel loads and fire

[4] Basal Area Range square feet of basal area for stands with average diameters of 7 inches to 16 inches diameter breast height.

hazard. Growth of individual trees would decrease as inter-tree competition increases. As stands exceed the UMZ and vigor of trees decreases increased susceptibility to beetles would occur. Domination of lodgepole pine in some stands regeneration would occur naturally. The amount of the planning area susceptible to bark beetle infestations would increase as more stands grow into beetle susceptible conditions.

Annual spread of bark beetles is typically less than a mile from infected stands. Higher populations in dense stands can impact adjacent less dense stands that are more resistant to beetles, and individual trees can be attacked and mortality can occur. The large amount of susceptible stands in the Lava Cast area would likely impact adjacent susceptible and non-susceptible stands. With the Lava Cast Fuels CE there will be 1,700 acres of underburning. This is likely to attract bark beetles to those stands though these stands were thinned before and are generally growing well. This attraction over the three to five years following prescribed burning may cause some mortality to the trees from beetle infestation. This is more likely to occur on the most stressed trees. The stress may be caused by tree competition, fire, drought or a combination of all three. Of the Tract C lands within the planning area which are to be sold, 637 acres are presently at risk to bark beetle attack. The Tract C lands to be sold from government ownership are susceptible to bark beetle infestation and if they continue at current stocking levels may impact adjacent Forest Service stands with bark beetle populations. If these lands are developed and trees cut it would reduce the area susceptible to beetles by an additional 637 acres and reduce the total susceptible area by 2%. It is unknown as to how these stands would be managed in the future.

Alternatives 2 & 3

Reducing bark beetle susceptibility to below 30% in the overall area helps to reduce beetle impacts in susceptible and non-susceptible stands by having less chance of large populations to develop and spread. The Lava Cast Fuels CE treatments when fully implemented prescribe burn approximately 1,700 acres. Coupled with proposed prescribed burning of 5,484 acres in this project causes some increase in attraction and attack by bark beetles. This may cause some increase in mortality for 3-5 years. Historically mortality from bark beetles in prescribed burns is at low levels and in pockets through stands which are burned under relatively hot conditions and less than 5% of any one stand.

The two action alternatives have similar effects though some differences in densities occur in clumps and openings. The total acreages treated for alternative 2 is approximately 9,534 acres of commercial thinning and approximately 9,299 acres in alternative 3. Both action alternatives reduce the area susceptible to bark beetles to less than 30% of the planning area. Alternative 3 has more open areas through the removal of more of the lodgepole pine over approximately 8,000 acres than alternative 2.

Table 3-8: Lava Cast comparison of silviculture effects.

Effect of Treatment	Alternative 1 (No Action)	Alternative 2	Alternative 3
% Planning Area @ Imminent Risk to Bark Beetle	52%	28%	28%
% Stands for Thinning Imminently Susceptible to Beetle Risk (SDI > UMZ)	92%	< 1%	3%
% Thinning Stands @ 10 Yrs SDI > UMZ	98%	1%	17%
% Thinning Stands @ 20 Yrs SDI > UMZ	100%	72%	48%

The proposed thinning treatments, that result in wider spacing between trees and increases the stands to dominance by ponderosa pine where available, keep the stands from inter-tree competition. Tree growth above one inch diameter growth each decade maintains a resistance to beetle attacks. Faster growth allows the trees to grow into larger diameters and develop more fire resistance (Wyant et al. 1986). Healthy, fast growing ponderosa pine trees are less susceptible to fire mortality than dense, smaller diameter trees and lodgepole pine of all sizes. Wider spacing around large diameter ponderosa pine and removing mistletoe infected trees reduces stress on these trees and susceptibility to bark beetle mortality. Underburning following commercial harvest activities in both action alternatives occurs on 4,962 acres in alternative 2 and 4,703 acres in alternative 3 makes these areas more susceptible to bark beetle attack. This is due to the attraction of bark beetles to freshly burned areas and weakened trees from fire for approximately 3-5 years. The burning has less effect on healthier trees.

FIRE and FUELS

Scope of the Analysis

The Lava Cast project utilizes boundaries analyzed previously in the *Deschutes and Ochoco 5 Year Accelerated Fuel Treatment Strategy that Improves Condition Class* (May 2004). This strategy scored the Lava Cast project area with the highest overall ranking for treatment based on values at risk, fuels and vegetative condition, community involvement and economic opportunity and is the basis of the strategy's long term emphasis to maintain and restore fire prone ecosystems at the landscape scale. The Lava Cast project contributes to implementing the strategy by proposing treatments for WUI and non-WUI areas. This is accomplished by treating hazardous fuels on federal lands east and adjacent to "at risk" WUI communities identified in the Sunriver and Upper Deschutes River Natural Resource Coalition's Community Wildfire Protection Plan's boundaries. This would include communities such as Crosswaters, Vandevert Ranch, Vandevert Acres, Foster Road District and the future planned community of Caldera Springs.

Lava Cast is one of several projects within the larger landscape discussed in the 5 year treatment strategy and ties to the adjacent Fuzzy project area to the Northeast. These projects

tie together, with others, that cover an estimated 400,000 acres identified in the strategy on both forests as being "out-of-balance" and in need for maintenance and restoration of its fire prone ecosystem including WUI lands.

In order to assess the need for restoration of fire adapted ecosystems and how out of balance the vegetation structure and its resulting function of the ecosystem is, Fire Regime Condition Class was used to represent the levels at risk from uncharacteristic wildland fire in reference to historic conditions. The severity and effects from wildfire were predicted using fire behavior fuel modeling and the Forest Vegetation Simulator – Fire and Fuels extension to determine the probability of stand replacement fire by crown fire in the Lava Cast project area.

The fire and fuels analysis provides rationale for where to treat and what treatments would be effective in reaching desired conditions to reduce adverse fire behavior and effects and assist the landscape in its ability to function as it did historically, as a fire adapted landscape.

Plant Association Groups (PAG) with the planning area include ponderosa pine (18,989 acres), lodgepole pine dry (6,622 acres), mixed conifer dry (6,386 acres) and mountain hemlock (14 acres), cinders, lava and rock cover 3,003 acres. These PAGs were combined with fire behavior Fuel Models (Anderson, 1982) to estimate existing fire behavior potential in the project area. Fires in Fuel Model 6 have potential to exhibit extreme fire behavior.

A computer modeling analysis tool, "Consume" was used to estimate smoke emissions for proposed underburning and smoke production. Outputs for an average 40 acre Lava Cast treatment unit for PM 10 emissions is 11.81 pounds/ton and PM 2.5 was 11.26 pounds/ton. It was also queried for PM 10 smoke production for 100 acres of pile burning in mixed conifer and lodgepole pine stands. Estimates were .07 pounds/ton for PM 10 and .06 pounds/ton of pm 2.5 If these estimates do not meet the Oregon State Smoke Management specifications for burning, the burn plan would be modified to meet weather conditions or burning would not commence until those conditions can be met. Emissions specifications are determined on the day of burning and are weather dependent.

Affected Environment and Existing Conditions

The planning area encompasses about 36,000 acres, 32,000 acres classified as forest land. Within the planning area 2,369 acres (7% of the planning area) are considered WUI adjacent to the Upper Deschutes Coalition Community Wildfire Protection Plan boundary. A portion in the northwest of the planning area bounds the Sunriver Community Wildfire Protection Plan boundary on the south. These communities have been listed as "At Risk Communities" in the Deschutes National Forest Prevention Management Plan and are defined as: "Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire" (issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with title IV of the Department of the Interior and Related agencies Appropriations Act, 2001).

Fire exclusion over the past 90 years in this fire adapted ecosystem has led to a change in fire effects, creating the potential for costly and more damaging fires (see Silviculture sections, **Comparison of Current and Historic Conditions** and **Historic Structure Determination)**.

Fire exclusion has contributed to the increase in hazardous fuel conditions, increasing the potential for high intensity fire behavior. Sixty percent of the planning area is classified as high or extreme for wildfire behavior potential due to the change in vegetative conditions (i.e. denser forest stands, effects from insects and disease). In addition, the onset of urban interface home construction, as well as increased recreation pressure on the National Forest, has increased the possibility of fire starts and the risk of loss of resources from a fire. Fire occurrence records indicate lightning fires account for almost half of the fires (average 5 per year in the Lava Cast planning area) in central Oregon. Between 1987 to present there have been 92 known fire occurrences; 40 lightning, 15 arson and 37 other human caused fires. This increased trend of human caused fires contributes to the risk for fire starts in the planning area. Should a fire start, go undetected and escape initial attack in average summer weather conditions (80 degrees temperatures with a light wind), a wildfire could burn approximately 100 acres in 1 hour. The trees that are not consumed directly by the fire would still have a high degree of mortality from the intense heat. To the north, the 18 Fire (3,810 acres) just adjacent to the planning area is an example of a stand replacing wildfire that burned in fuel model 6 with ponderosa pine overstory in 2003.

For fuel models 6, 3, and 10 flame lengths rise above 4 ft. at 5 mph with dead fuel moisture content at 8%. Weather and fuel moistures recorded from the Lava Butte weather station record the 90th percentile weather (10% of the time) to be wind at 12.0 mph and the 10 hr fuel moistures (0-1inch woody) to be at 8%. Given this 90th percentile day it could be assumed that winds of 5mph would be more common/average and that 60 % of the conditions in the Lava Cast project area are subject to high and extreme fire behavior and not controllable with direct attack therefore, conditions of a larger fire scenario with flame lengths promoting fire into the tree's crown, would most likely be stand replacing, and a hard to control fire event.

Table 3-9: Current fuel model acreage, description and associated fire behavior potential.

Fuel Model	Description	Acres	Fire Behavior Potential
2,9	2- short grasses in pine, 9-long –needle litter	8,885	Moderate
5,8	5-young or low green shrubs, 8-compact conifer slash	2,063	Low
3,10	3-tall grasses, 10-dead down woody fuels	8,531	High
6	6-shrubs	12,931	Extreme
Non-Veg.	Non- veg., lava flow	3,635	Low

The Lava Cast planning area lies within the highest overall ranked scoring for watershed treatment priority in the *Deschutes and Ochoco 5 Year Accelerated Fuel Treatment Strategy that Improves Condition Class*. Factors that lead to this ranking are:

1. Much of the planning area is comprised primarily of single-story and multi-story ponderosa pine, established primarily following logging in the 1920s and 1930s.
2. Approximately 16,851 acres of the planning area, or 53% percent of the forested acres, are classified as imminently susceptible to bark beetle. Mistletoe is prevalent

throughout the planning area with some areas of severe infection. These conditions create the potential for moderate to high fire behavior to occur.

With these conditions it is not desirable to rely on natural disturbance processes to resolve decades of fuels accumulation in much of the planning area. Thinning and other fire/fuel hazard reduction treatments are necessary to reduce the risk of stand replacing wildfires and the continued adverse effects of insects and disease.

Furthermore, historical fire records indicate low intensity fires maintained and thinned ponderosa and lodgepole pine stands on an average 7 to 15 year cycle (Agee 1993). Changes in forest density, composition, and public use have occurred within the Lava Cast planning area since the early 1900s when wildfire suppression and timber harvest activities began. For example, during the late 1920s, the Shevlin-Hixon company clearcut more than 60% of the planning area. This had a direct effect on the current vegetation structure of the area that is comprised of overstocked, young stands.

Pre–settlement vegetative reference conditions found prior to being influenced by direct and indirect affects of European settlement are correlated with fire behavior fuel models 8 and 9 in which "slow-burning ground fires with low to moderate flame lengths are generally the case. Only under severe weather conditions involving high temperatures, low humidity's, and high winds do the fuels portrayed in the models pose fire hazards." (Anderson, 1982)

Prior to European settlement (1700-1860), fires in the east side of the Cascades burned approximately every 7 years consuming 50 to 60 percent of the ground fuels. This allowed for continual reduction of ground fuels and provided conditions for low intensity burning in the event of a fire start. Due to fire suppression the mean fire-free interval has been stretched to 40 years, allowing fuel buildups and increasing the probability of a severe, stand replacing event.

Historically, Native American fires considerably influenced the low- severity fire regimes (Agee, 1993). Once this historical natural fire regime is restored future maintenance burning should emulate this historical involvement by man in an approximate cycle of 7-15 yrs. Low cost underburning or mechanical shrub treatments can then continue to reduce the risk of a catastrophic fire event in a growing wildland urban interface

During the last 100 years since the onset of organized wildland fire fighting, historic large fire activity (100 acres and greater) in the Lava Cast planning area records only 8 fires with an average size of 574 acres. Early records show a 7 year interval return between 1911 and 1918. The next fires occur in 1927 (9 yr-return). There are no large fires until 1995, 68 years later, with an average size of 141 acres. In 2003 the 18 Fire occurred in the adjacent planning area, and even with suppression efforts, it grew to 3,810 acres. With the increasing capability of fire suppression and its correlation to increased fuel loading, coupled with the increased risk due to higher population and recreation use, the assumption is that the probability of fire starts and larger fires could increase.

As previously noted Fire Regime Condition Class (FRCC) defines a natural fire regime (see Table 3-9) in terms of the role fire would have played across a landscape in the absence of

modern human suppression efforts, but does include the influence of aboriginal burning. It classifies condition class as the amount of departure from a natural fire regime. Three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime.

Table 3-10: Five natural fire regimes.

Fire Regime	Frequency (years)	Fire Severity	Description of fire severity	% of Planning Area
I	0-35	Low to mixed	< than 75% of the dominant overstory vegetation replaced	54
II	0-35	High	> than 75% of the dominant overstory vegetation replaced	0
III	35-100	mixed	< than 75% of the dominant overstory vegetation replaced	18
IV	35-100	High stand replacement	> 75% of the dominant overstory vegetation replaced	17
V	200 +	High stand replacement	> 75% of the dominant overstory vegetation replaced	0

Seventy two percent of the project area is in conditions class II & III (54% and18% respectively; Table 3-11 below). Seventeen percent of the project area is in fire regimes 4 (high fire severity) with condition classes II and III.

Table 3-11: Fire Condition Classes.

Condition Class (cc)	Descriptions	% of Planning Area
I	Within the central tendency of natural (historical) range of variability of vegetation characteristics: fuel composition; fire frequency, severity, pattern; and other associated disturbances.	15
II	Moderate departure from the central tendency natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity, pattern and other natural disturbances.	54
III	High departure from the `central tendency' of natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	18

EFFECTS

Fire exclusion in this short-interval, historically-fire adapted ecosystem has led to a change in fire effects, creating the potential for costly and more damaging fires. These high hazard conditions threaten the WUI, ecosystem health, public and firefighter safety, private and public property including Newberry National Volcanic Monument.

Alternative 1 - No Action

The No Action alternative would not address the high fuel loading that currently exists in the planning area. By not treating these conditions there would be no change to either improve

Condition Class or change fire behavior on the landscape to improve public and firefighter safety or restore and maintain fire-dependent ecosystems.

Seventy two percent of project area is outside the range of variability (Condition Class II and III, 54% in II and 18% in III) and would continue to grow further outside of these historic conditions. Fuel composition; fire frequency, severity and pattern; and other associated characteristics would continue to depart from the HRV.

Increased fuel loading caused by mortality from pine beetle infestation has the ability to create hazardous fuel conditions found in fuel models 6, 10, and 11 over the short and long term. Fires fueled by these conditions can range from fairly active to rapidly spreading fires with high intensities capable of generating firebrands that carries the fire in front of itself. (Anderson, 1982)

Should a wildfire occur in untreated stands, smoke emissions would contain approximately 90% PM 10 (or smaller) in diameter particles which are considered to be a health hazard (Oregon Smoke Management Guide). The adjacent WUI and the nearby communities of Bend to the north and Sunriver to the west of the project area are at risk from smoke impacts should a large stand replacing wild fire occur.

Population of Deschutes County has grown in the last five years by 81%. The estimate of growth in the coming 5 years continues at the rate of 85%. By the year 2025 the growth population forecast will increase by 67%. (Deschutes County Coordinated Population Forecast Project). High economic housing costs are transferring growth to the bedroom communities south of Bend in private lands inter-mingled, adjoined and adjacent to Federal lands that includes lands adjacent to the Lava Cast planning area. Current fire occurrence records indicate an average of 92 known fire starts within the project's boundaries in a 10 year period (15 arson starts). Forest visitors to the project area have increased and extra fire risk is assumed especially in the form of OHV use on the rise within the planning area.

Alternative 2 – Proposed Action

By returning 9,512 acres to pre-settlement fuel levels represented by Fire Behavior Fuel Models 8 (lodgepole) and 9 (ponderosa pine), the acres capable of Extreme Fire Behavior potential would decrease by 26% in the entire project area. It would also increase the potential for a lower risk return of pre-settlement low intensity wildfire should one occur. Changing the high and extreme fire behavior potential of Fuel Models 3, 6 & 10 to low moderate fire behavior of Fuel Models 8 and 9 would reduce flame lengths below 4 feet at a wind speed of 5 mph. Fires below 4 feet can be controlled by direct attack and usually contained at a smaller size than with an indirect tactic used to control a crown fire. It is calculated that firefighters can direct attack a fire withstanding calculated BTU's and rate of spread at 4 foot and below flame lengths. (*Fire Behavior Fire Characteristics Chart*, Andrews and Rothermel, 1982).

Probability of crown fire would be reduced as predicted with the Forest Vegetation Simulation Fire and Fuels Extension. Given the silviculture and fuels prescriptions designed for reducing fire hazard under this alternative, the model predicted that should a fire start in areas treated to FM 9 conditions, it should stay on the ground and not accelerate into a crown fire. This is the

desirable condition because suppressing wind driven crown fire is usually only achieved by a consistent break in crown continuity or weather changes.

Proposed forest thinning and fuels treatment would change conditions on approximately 9,512 acres of Condition Class II and III (moderate to high departure from the central tendency of the natural historical regime) to Condition Class I and II in the planning area. In WUI it reduces fuel loadings and fire intensity on 885 acres and would help to reduce the fire risk for communities adjacent to the boundaries of the Upper Deschutes Natural Resources Coalition and CWPP.

Approximately 229 acres would be treated to move them closer to the characteristics of Condition Class I with the ability to mimic Fire Regime I (fire return interval 0-35 years) through the use of prescribed underburning. These 229 acres are mixed stands that would be treated by removing all lodgepole and leaving ponderosa as the predominant fire adapted species.

The proposed prescribed burning is estimated to produce controlled smoke emissions from 5,437 acres (hand pile burning 534 acres and 5,437 acres of underburning). Prescribed fire smoke is planned and managed to reduce unhealthy and hazardous particulate matter (PM 2..5 and PM 10) smoke emissions and are in accordance with Oregon State Smoke Management This eliminates or minimizes the effect to public vs. unhealthy amounts (90%) of PM 10 emissions that would be produced should a wildfire occur (Oregon State Management Guide).

Alternative 3

This alternative increases resistance to wildland fire within the project area by having ponderosa pine dominate in the treated stands. It does not treat 324 LOS acres in the WUI that are proposed for treatment in Alternative 2. As such, it does not contribute to reducing fire behavior or condition class, nor contribute to the return of ponderosa pine to its historical range on these acres.

There is a total of 6,382 acres prescribed for fuels treatment by either prescribed underburning, handpiling or grapple piling and burning, or mechanical shrub treatment. Approximately 975 of these acres are in the WUI. This is 157 acres less fuels treatment than in Alternative 2. This is because the Upper Deschutes River Coalition CWPP was updated, including a change in the eastern boundary of the WUI. As such, the WUI acres changed during the planning process, resulting in a net loss of proposed treatment acres in this alternative.

Alternative 3 removes 6,877 acres of lodgepole and white fir from stands, resulting in Condition Class I. Altering the species component to ponderosa, a fire adapted species, from a mixed conifer setting creates a fire resilient stand. Alternative 2 achieves this only on 229 acres. Modeled fire behavior runs using the Behave program estimates 90% mortality in mixed stands verses 33% in ponderosa stands. Under prescribed burn conditions mixed conifer stands have 68% mortality and ponderosa stands 10% mortality.

Alternative 3 creates openings in the stands of 2 acres in size break up fuel continuity for fire spread, but would need continued maintenance to discourage encroachment of ladder and flashy fuel components of brush and tall grasses and seedling trees.

Proposed forest thinning and fuels treatment would change conditions on approximately 6,877 acres of II and III (moderate to high departure from the central tendency of the natural historical regime) to Condition Class I in the planning area. Another 2,402 acres of Condition Class II and III would be converted to Class II. In WUI it reduces fuel loadings and fire intensity on 938 acres in the WUI and would help to reduce the fire risk for communities adjacent to the boundaries of the Upper Deschutes Natural Resources Coalition and Sunriver's CWPPs.

WILDLIFE

Introduction

Generally three documents provide guidance or species lists for consideration in the management of federal lands. The three documents and associated species lists include the Deschutes National Forest – Management Indicator Species, the US Fish and Wildlife Service Birds of Conservation Concern, and a Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington. Species listed in these documents overlap with each other as well as the threatened, endangered and sensitive species lists.

Neotropical migratory birds have become species of interest recently, due to the downward trend of landbirds in the western United States. The decline of these populations are a result of many complex issues, but factors believed to be responsible include; loss, fragmentation, and alteration of historic vegetation communities. Other probable causes to the decline include predation from feral species, nest parasitism, and use of pesticides associated with agriculture areas. There is currently an Executive Order (131186) that provides for enhanced cooperation between the Forest Service and USFWS in regards to addressing impacts to Neotropical migratory birds in conjunction with the Migratory Bird Treaty Act. Specific activities are identified where cooperation between the parties would substantially contribute to conservation and management of migratory birds, their habitat, and associated values, and thereby advances many of the purposes of the Executive Order.

In response to this Executive Order and subsequent compliance with the Migratory Bird Treaty Act, the Deschutes National Forest is currently following guidelines from the "Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington" (Altman 2000). This conservation strategy addresses key habitat types as well as biological objectives and conservation strategies for these habitat types found in the Columbia Plateau, and the focal species that are associated with these habitats. The conservation strategy lists priority habitats: 1) Ponderosa Pine 2) Mixed Conifer (Late Successional) 3) Oak-Pine Woodland 4) Unique Habitats (Lodgepole Pine, White Bark Pine, Meadows, Aspen, and Subalpine Fir). There is no Oak-Pine Woodland, White Bark Pine, Meadows, or Subalpine Fir habitat within the Lava Cast Planning area.

Habitat manipulation affects species differently. An action that may increase habitat for one species may decrease habitat for another species. Federal threatened, endangered, and regionally sensitive species lists are always consulted first. Species that do not appear on these lists but show up as a management indicator species or focal species, or species of concern may have persistence issues at a regional or national level but may not have persistence issues at the state or local level. In order to get an idea of the level of concern for these species, rankings were obtained from Natureserve Explorer: an online encyclopedia of life, available at www.natureserve.org/explorer.

Scope of Analysis

Species populations and distributions were not discussed in depth. Rather, effects on habitats and habitat components were discussed with the assumption that if appropriate habitat is available for a species, then that species occupies or could occupy the habitat. Specific habitat components analyzed include: snag/coarse woody material (CWM), habitat/green tree replacements (GTR's) and late/old structural habitat (LOS). Population trends were determined by assessing how the alternatives impact the structure and function of the vegetation (i.e. habitat) relative to the current and historic habitat availability. Inferences regarding species diversity and relative population levels were made based upon habitat quality, condition, and quantity. Where needed and applicable, professional judgment, supported by the available information, was used to assess habitat conditions and quality. The Lava Cast Silvicultural Report (Silviculture Specialist Report) details the historical patterns and structure within the planning area. Field reconnaissance information, current analysis tools, recent literature, and Geographical Information System databases provided additional information. This approach is consistent with current federal planning regulations as cited in the Federal Register/ Vol. 70, No. 3 Wednesday, January 5, 2005/ Rules and Regulations.

Some wildlife habitats required a more detailed analysis and discussion. Level of analysis depended on the existing habitat conditions (i.e. limited habitat availability versus widespread habitat availability), the magnitude and intensity of the effects of the proposed actions (i.e. would the proposed actions cause a loss, no change, or increase in habitat), the risk to the resources (sustainability and availability of the habitat), and the significant issues identified. These factors were used to form conclusions as to how the information with regards to the effects would be useful and relevant in the process of making an informed decision.

Table 3-1 lists the past, present, and reasonably foreseeable actions which were used for the analysis of cumulative effects. The effects of past projects prior to those listed have been included in the existing condition discussion under each subject heading and do not appear as separate projects. These past actions are either no longer having effects that would overlap the effects of the proposed action in time and space, or if their effects are ongoing, these effects have been incorporated into the existing habitat conditions and it is not useful or relevant to the decision making process to analyze them separately.

Because the effects deal with forest development which inherently involve multiple decades, short-term impacts are addressed over a < 20-30 year time span while long-term impacts are addressed for over a time span > 30 years. Similarly, the timeframes used to address cumulative effects may vary by species but would generally include a time span of 20 years,

which would roughly equate to more than one generation of the species. Spatially, cumulative effects would generally start at the planning area level (36,000 acres; approximately 32,000 forested acres) and then, dependent upon potential impacts, may include adjacent and nearby planning areas. The spatial boundary for cumulative effects is dependent on the species or wildlife habitat discussion and potential additive effects with the proposed action(s). These cumulative effects boundaries will provide for a range of habitat conditions that occur on the landscape that generally encompass at least a few home ranges of a species.

The following threatened, endangered, proposed or sensitive animal species are either known to occur or may potentially occur on the Bend-Ft Rock District; those known to occur or that may have the potential to occur (e.g. suitable habitat) are marked with an "X":

Table 3-12: Threatened, endangered, proposed or sensitive species that occur or may occur on the Bend-Fort Rock Ranger District.

SPECIES	COMMON NAME	FEDERAL CLASSIFICATION	OCCURS or POTENTIAL in Project Area
Birds			
Haliaeetus leucocephalus	Northern bald eagle	T	X
Strix occidentalis caurina	Northern spotted owl	T	
Falco peregrinus anatum	American peregrine falcon	S	
Bucephala albeola	Bufflehead	S	
Histrionocus histrionicus	Harlequin duck	S, SOC	
Numenius americanus	Long-billed curlew	S	
Centrocercus urophasianus	Greater sage grouse	S, SOC	
Podiceps auritus	Horned Grebe	S	
Podiceps grisegena	Red-necked Grebe	S	
Coturnicops noveboracensis	Yellow Rail	S	
Agelaius tricolor	Tricolored Blackbird	S	
Mammals			
Lynx canadensis	Canada lynx	T	
Gulo gulo luteus	California wolverine	S, SOC	X
Martes pennanti	Pacific fisher	C	
Sylvilagus idahoensis	Pygmy rabbit	S, SOC	
Amphibians			
Rana pretiosa	Oregon spotted frog	S, C	
Key to abbreviations: T=Threatened, E=Endangered, P=Proposed for Federal listing, S=USFS Region 6 Sensitive, C=USFWS Candidate species, SOC=USFWS Species of Concern			

The biological evaluation (BE) describes and displays any effects to threatened, endangered (listed or proposed for listing) and sensitive (TES) fauna species associated with Alternatives 1, 2, and 3 of the Lava Cast Project on the Bend/Fort Rock Ranger District. A summary of conclusions for the two species identified in Table 3-12 are as follows:

Bald Eagle There is no known habitat within the project area. The closest proposed unit is 300-400 feet from the Little Deschutes River. Use of the river by eagles may be incidental and likely for foraging or hunting. There would be **No Effect** to the bald eagle or its habitat as a result of the project.

Wolverine: There are no current or historic wolverine sightings within the project area. There have been credible sighting of wolverine to the south and east of the project area (1995, 2000). The project area does not contain viable habitat that would sustain breeding populations for the wolverine. The project area is low in elevation and the only potential use of the project area by wolverine would be for dispersal. There would be **No Impact** to the wolverine or its habitat as a result of the project.

The proposed project area was evaluated to determine which species might occur based on the presence of required habitats and known locations. There are no known lynx sightings within the project area. Furthermore, in a letter dated June, 2003, from the Forest Wildlife Biologists for the Deschutes and Ochoco National Forests to the District Wildlife Biologists a conclusion was made that "…the best science available was consulted and this science indicates that neither self sustaining populations of Canada lynx nor its habitat are present on the Deschutes or Ochoco National Forests or the Crooked River National Grassland; therefore, no effects to the continued existence of the species or its habitat are expected as a result of land management activities on these administrative units." (S. Jeffries, Deschutes Forest Biologist and D. Zalunardo, Ochoco Forest Biologist Letter dated June 19, 2003 to File Code: 2670; Subject: Canada lynx (*Lynx canadensis*) habitat mapping; To: District Wildlife Biologists, Deschutes and Ochoco National Forest and the Crooked River National Grassland).

The following evaluation criteria were developed in order to compare the alternatives (including no action) and highlight the relevant measures for each species or habitat component discussed.

LOS/OGMA (Old Growth Management Area) and Connectivity

1) The number of acres of current LOS proposed for treatment.
2) The number of proposed units and acres located within a corridor.
3) The number of acres of variable thinning to maintain a multi-layered stand characteristic.

Dead Wood Habitat: Snags, Coarse Woody Material, Green Tree Replacements and Cavity Nesting Species

1) The number of acres treated that will reduce recruitment of dead wood; i.e. commercial thinning.
2) The availability of snags $\geq$ 10" dbh currently.
3) The number of acres of larger downed wood removal due to fuels treatments

Elk and Deer Habitat (including open road density)

1) Estimated hiding cover levels in relation to LRMP standards both within the planning area and over the landscape.
2) Open road density in planning area.

Goshawk, Cooper's, Sharp-shinned, and Red-tailed Hawks, and Osprey: ***In conjunction with the LOS and Connectivity criteria the following are added:***

1) The number and percent of acres of potential habitat altered: Red-tailed hawk: # acres of thinning that creates habitat, Cooper's and Sharp-shinned hawk: # acres of current habitat treated, Goshawk: # acres of current habitat treated, Osprey: # ac treated (commercially thinned) to create large trees.
2) The estimated number of pairs potentially found in the planning area (goshawk, Cooper's and sharp-shinned hawk).

Marten: ***In conjunction with Dead Wood, LOS and connectivity criteria:***

1) The number of acres of current and potential marten habitat thinned.
2) The number of acres of potential marten habitat treated for dwarf mistletoe.
3) The number of acres of grapple-piling of larger CWM for fuels treatments in current and potential marten habitat.

Bats

1) The number of acres of LOS ponderosa pine developed.
2) The number of acres of mowing.

Landbirds: ***In conjunction with Dead Wood and LOS criteria***

1) The Conservation strategies addressed for Ponderosa Pine, Lodgepole Pine, and Mixed Conifer.

Ponderosa pine (PP): # acres of prescribed burning in PP types; # acres of thinning in PP; # of miles of roads closed.

Lodgepole pine (LP) old-growth: # ac LP LOS treated; # ac of all LP treated.

Mixed Conifer (MCD): # ac Rx burning in MCD; # ac HTH without pre-commercial thinning (SPC) in MCD; # miles of roads closed.

Affected Environment and Existing Conditions

The Deschutes LRMP presents standards and guidelines for the maintenance of wildlife habitat. The Environmental Assessment for the Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (Eastside Screens 1995) present standards and guidelines for wildlife habitat east of the range of the Northern Spotted Owl.

Species List

The following species were included in this analysis. Species that are listed or proposed for listing as threatened or endangered, or are on the Regional Foresters sensitive species list are analyzed in the Biological Evaluation of threatened, endangered, and sensitive wildlife for the Lava Cast Project.

Table 3-13: Management Indicator Species and Species of Concern

Species	Status[1]	Habitat or Species Present?	Natureserve ranking in Oregon[2]	Possibly Limiting Habitat Feature[3]	Will Project Potentially Impact Species or Habitat?
Cooper's hawk	MIS	Y	S4	Dense forest canopy	Y
Northern goshawk	MIS,SOC	Y	S3	(1)	Y
Sharp-shinned hawk	MIS	Y	S4	(4)	Y
Red-tailed hawk	MIS	Y	S5	Large trees for nesting	Y
Golden eagle	MIS	N	S4	(6)	N
Osprey	MIS	Y	S4	Large trees for nesting, water body	N
Great Gray Owl	MIS	N	S3	(1, 4-LPP,PP, 5)	N
Flammulated owl	Focal	Y	S3	(1,2, 4, 5 PP)	Y
Pileated woodpecker	MIS	N	S4	1, 2, moist mixed conifer	N
Common flicker	MIS	Y	S5	2	Y
Hairy woodpecker	MIS	Y	S4	2	Y
Northern 3-toed woodpecker	MIS	Y	S3	2, LPP	Y
Lewis's woodpecker	MIS, Focal	N	S2	(2-large snags, 7-burns)	N
White-headed woodpecker	MIS, Focal	Y	S2	(1-PP, 2, 7-sugar pine)	Y
Black-backed woodpecker	MIS, Focal	Y	S3	(1-LPP, 7-burns)	Y
Williamson's sapsucker	MIS, Focal	Y	S4	(2-large snags,)	Y
Pygmy nuthatch	Focal	Y	S4	(1-PP, 2, 7-large trees)	Y
Red-naped sapsucker	MIS, Focal	N	S4	2, aspen & riparian woodland	N
Brown creeper	Focal	Y	S4	(1-MC, 7-large trees)	Y
Olive-sided flycatcher (NTMB)	SOC, Focal	Y	S3	(1, 2, 7 –burns, clearings, edges)	Y
Hermit thrush	Focal	Y	S4	(1-MC, 7-dense, multi-canopy conifers)	Y
Nashville warbler (NTMB)	Focal	N	S4	Riparian, deciduous woodland	N
Ash-throated flycatcher	Focal	N	S4	Scrub, juniper	N
Sage thrasher (NTMB)	Focal	N	S4	Sage and mt. mahogany	N
Gray flycatcher (NTMB)	Focal	N	S4	3	N
Clark's nutcracker	Focal	N	S4	High elevation forest	N
Chipping sparrow (NTMB)	Focal	Y	S4	(7- open understory w/ regen.)	Y
Great blue heron	MIS	N	S4	Wetland, marsh	N
Waterfowl	MIS	N		Lakes, streams, rivers	N
Sandhill crane	Focal	N	S3	Wetlands, meadows	N
Rocky Mt. elk	MIS	Y	S5	(7-grass, shrubs winter rng.)	Y
Mule deer	MIS	Y	S5	(7-shrubs winter rng.)	Y
American marten	MIS	Y	S3	X (1-MC, LPP, 7-CWM)	Y
Western big-eared bat	MIS, SOC	Y	S2	(3-foraging, 6-caves)	N

NTMB = Neotropical Migratory Bird

[1] Status: MIS – Management Indicator Species, SOC – USFWS Species of Concern, Focal – Species identified in the Conservation for Landbirds of the East-Slope of the Cascade Mountains in OR and WA (Altman 2000) and the Conservation Strategy for Landbirds in the Columbia Plateau of Eastern OR and WA (Altman and Holmes 2000).

[2] Oregon Sensitive Species determined from the Natureserve database for Oregon: S2 = imperiled, S3 = vulnerable, S4 = apparently secure, S5 = secure.

[3] Habitat feature codes: 1 = late and old successional forest (LOS), 2 = snags, 3 = mature shrubs, 4 = dense conifers for nesting/foraging, 5 = meadows or grassy openings for foraging, 6 = special/unique habitats (rock, cliffs, caves, etc.), 7 = other, noted. Abbreviations: LPP = lodgepole pine, PP = ponderosa pine, MC = mixed conifer, CWM = coarse woody materials (logs and limbs > 3" in diameter).

EFFECTS

See Appendix F for a comparison by alternative of management indicator animal species.

CONNECTIVITY/OGMA (Old Growth Management Area)

Existing Condition

On the east side of the planning area, much of the connectivity corridors exist within forested stringers of mid to late seral mixed conifer and lodgepole pine. As you move to the western side of the planning area to lower elevations, the plant association changes to ponderosa pine where some of the connectivity exists in late seral ponderosa pine but the majority of it is mid seral or "black bark" ponderosa pine. There are several buttes with steep slopes and many stands of forested lava (i.e. old lava flows with trees growing on them). Many of these areas contain the residual stands of late seral ponderosa pine. These corridors provide key linkages of not only big game habitat but also late and old structure habitat (LOS) or closed canopied forest and those species associated with this habitat (e.g. forest hawks, marten).

Connectivity corridors designed in the planning area are 600' wide, which is above the minimum standard of 400' (Eastside Screens). Mapped corridors within the planning area provide movement north to south as well as east to west. The corridors link LOS stands as well as the one designated Old Growth Management Area (OGMA) a minimum of 2 directions (Eastside Screens Standard). Many of the corridors are located within the mid-structural stage (SS5) lodgepole pine, ponderosa pine, and mixed conifer because that was the best available habitat.

Alternative 1 - No Action

With the No Action alternative, connectivity would remain unchanged in the short-term. In high-density stands where fuel loading is high, risk of a stand replacing fire would increase over time. A stand-replacing fire would further decrease connectivity in the area. Disease and insect infestation occurs within some stands designated within corridors, but is not at epidemic levels. Common insect infestation and disease in these stands vary from pockets of root rot to mistletoe and bark beetle attack. In these particular areas, connectivity would slowly decrease due to dying stands of trees. By not treating stands outside of the corridors, connectivity may deteriorate both within corridors and outside of them that could result in the planning area becoming fragmented due to the lack of fully developed stands.

Designated corridors within the planning area connect to other corridors in adjacent planning areas. Not treating the stands outside of the corridors would have no short-term cumulative impacts to connectivity over the adjacent planning areas. However, elevated risk of fire and/or disease would remain and there would be an elevated risk of loss of connectivity (i.e. increase in fragmentation) as a result of a large wildfire or widespread mortality of trees.

The anticipated results due to the absence of treatments are cumulative to the effects of projects occurring within the wildland-urban interface and the highway/urban development infrastructure. With a trend of increased mortality and risk of wildfire, and in the event of a

wildfire or other widespread die-off within the planning area, there would be cumulative effects to connectivity (especially east-west dispersal) with these other activities. As a result of urban interface in the vicinity of the planning area, conveyance of the Tract C lands, widening Highway 97 vehicle corridor, and the continued urbanization of the surrounding areas, it has become increasingly difficult for animals to move east-west throughout this landscape. Effects could be more pronounced in the event of a large wildfire or beetle-mortality that eliminates large areas of forested cover. That is to say, an area fragmented by wildfire (a possible indirect impact by taking no action) would add to the ongoing effects of further disrupted connectivity due to residential development (Tract C lands) and Highway 97 improvements (widening and interchanges).

Alternative 2 – Proposed Action

There are approximately 2,534 acres within the planning area designated as connectivity corridors according to the Eastside Screens. There are 31 units that overlap with connectivity corridors to some degree. Of these units, fifteen (15) bisect the corridors 90 to 100% for a total of 230 acres (EA units – 70, 72, 73, 75, 82, 83, 126, 132, 143, 145-147, 254, 264, 267). Units that only slightly overlap the corridors by 1-6 acres are not anticipated to affect the corridor.

Units that bisect the corridors are largely in the ponderosa pine associations.

Proposed actions within these particular units include combinations of commercial thinning, pre-commercial thinning and fuels treatments. Fuels treatments include mowing, hand-piling and/or underburning.

Alternative 3

Similar to Alternative 2, this alternative proposes combinations of commercial thinning, pre-commercial thinning and fuels treatments within the following units - 73, 75, 82, 83, 126, 132, 143, 145,147, 254, 264, 267. These are units that will bisect the corridors 90 to 100%. The total area within a corridor that also is proposed for harvest is approximately 225 acres. This alternative is similar to Alternative 2 with exception of two units or 49 acres of corridors that would not be treated. This is only a 2% difference of total corridor acres proposed for treatment.

Effects of both alternatives

Because there is only a 49 acre (approximately 2%) difference between the alternatives, effects would be similar.

Within the Eastside Screen under section A-2 “Connectivity Corridor Stand Description”, it states that within connectivity corridor stands medium to large diameter trees should be common and canopy closures are within the top one-third of site potential. After corridors are established and all LOS and Old growth areas are connected, if the stand is within the top 1/3 of site potential and cover can be maintained in the corridors, harvesting can occur as long as the site potential remains in the top 1/3. To analyze if the stands were in the top 1/3 of the site

potential, stand exam data was utilized and a stand density index was created. The upper management zone (UMZ) defines a limit to stand density in which the stand is at risk of disease and infestation and becomes unhealthy. If after treatment the stand was still within the top 1/3 of the UMZ it was within the top 1/3 of the site potential. None of the that bisect a corridor with a, commercial treatment would not take the stands below the top 1/3 of site potential. Natural fuels treatments are not expected to affect corridor function.

Treatments in wildlife corridors meet the upper 1/3 of the site potential and are beneficial in maintaining and developing LOS in these areas in the long-term. These action alternatives meet standards and guidelines for the Eastside Screens.

There are two planning areas that are presently being planned or implemented (Fuzzy and East Tumbull). Through the planning process connectivity corridors have not only focused on connection of LOS habitat with the current planning area but have focused on connectivity with these other two planning areas. Under the action alternatives for all projects, prescriptions focus on reducing the risk of beetle attack and catastrophic fire, especially within the ponderosa pine plant associations, and to retain connection throughout the landscape in the long-term.

Although there may be some reduced quality of connectivity because of treatments within some of the corridors, there would be minimal additive effects in the short-term because the corridors will still function as connections between habitats. Efforts to reduce the risk of loss of connectivity (i.e. the long –term effect of treatments) would off-set some of the short-term negative effects of proposed treatments within the corridors along with the following ongoing activities outside of National Forest Land:

Similar to the discussion of the effects of no action, as a result of urban interface in the vicinity of the planning area, conveyance of the Tract C lands, widening Highway 97 vehicle corridor, and the continued urbanization of the surrounding areas, it has become increasingly difficult for animals to move east-west throughout this landscape. Effects could be more pronounced in the event of a large wildfire or beetle-mortality that eliminates large areas of forested cover.

Road closures, especially those roads that cross corridors in relation to accessing a unit (2 miles), would help mitigate the short-term, reduced quality of corridors (reduced tree cover) caused by the proposed treatments by reducing the amount of disturbance and harassment within the corridor. This especially benefits small mammals and reptiles, because it allows a greater ability to use the corridor with lower risk of physical harm. Cumulatively over the entire planning area, road closures have an increasing benefit to wildlife.

The proposed actions would not have significant cumulative impacts to wildlife dispersal and movement because of the small percentage of corridor affected and the actions would still allow the corridors to meet management direction and function as linkages. Also there is the opportunity to reduce disturbance and harassment within the corridor due to use of roads that cross them. Actions outside of the corridors will reduce the vulnerability of the corridors to wildfire.

LATE/OLD STRUCTURAL (LOS) HABITAT

Existing Condition

Table 3-13 displays acres of LOS habitat by plant association group within the planning area.

Table 3-14: LOS Structural Stage (SS)* by Plant Association (PAG)

PAG	SS6	SS7	Total by PAG
LPD	165	36	201
MCD	340	150	490
PPD/PPW	475	212	687
Totals by SS	980	498	1378

* SS 6 = Multi-stratum with large trees; SS 7 = Single stratum with large trees (for further definition see Eastside Screens Direction). LPD = lodgepole pine/dry; MCD = mixed conifer/dry; PPD = ponderosa pine/dry; PPW = ponderosa pine/wet.

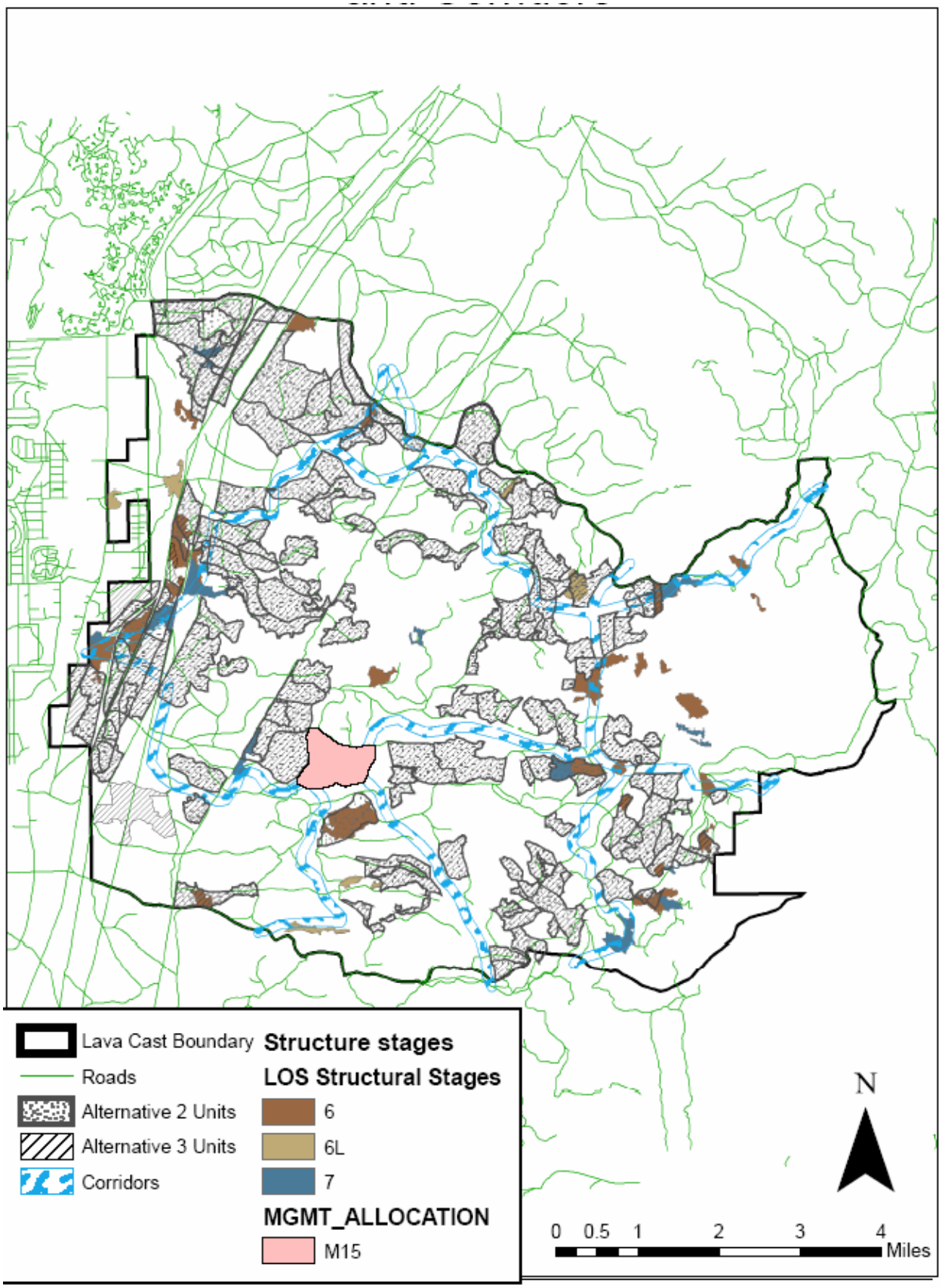
All of the LOS is of small patch sizes ranging from 1-100 acres, with most being 30 ac or less. Most of these patches are not large enough to encompass home ranges for the species associated with LOS. Late Seral conditions are limited throughout the planning area. There are approximately 32,000 acres of forested vegetative conditions within the planning area, of which 1,378 acres are classified as LOS (approximately 4% of the planning area).

Lodgepole pine: Structure stage 6, and 7 lodgepole pine, which is considered LOS for this forest type, occurs within pockets throughout the planning area. Hopkins (1992) determined that lodgepole pine that is found in Central Oregon today is an anomaly since these forests generally never grew into contiguous structured forests. It was estimated that fire frequency in climax lodgepole pine forest would range between 20 to 30 years. Pre-European settlement would best be characterized as vast stands of variously aged and sized lodgepole pine trees with average stem size being probably two – four inches in diameter at ground level. As a result of fire suppression since the early 1900's stands grew into the larger, denser size classes that we more commonly see today. Due to the amount of past beetle infestation and subsequent harvest activities, it is highly fragmented. As a result, there is a contrast in these areas consisting of early and recently regenerated stands of late seral lodgepole pine. These older stands of lodgepole pine provide habitat for LOS species such as black backed and three-toed woodpeckers as well as movement areas for other interior forest species such as American marten and goshawk. Beetle activity has slowed but continues in these stands and infestations of dwarf mistletoe continue. As a result, many of the trees are losing their vigor or are dead.

Ponderosa pine: The planning area consists of approximately 687 acres of LOS ponderosa pine which is approximately 2% of the planning area. The majority of the ponderosa pine stands were harvested initially in the 1930's and the LOS that remains are the residual unharvested stands. These LOS PAGs (PPW and PPD) provide habitat for a variety of species that rely on large trees and snags, and/or multi-layered forest canopies such as the northern goshawk, white headed woodpecker, and a variety of Neotropical migratory birds (See Landbirds section). This forest type also provides excellent forage and cover for big game and a variety of small mammals. Due to current stand densities there is the risk of high-intensity, stand-replacing fires that would kill the old trees associated with these areas.

Mixed Conifer: The mixed conifer habitat within the planning area is predominantly comprised of ponderosa pine, lodgepole pine, and white fir. There is approximately 490 acres of mixed conifer LOS, scattered mainly within the eastern part of the planning area in small (<50 acre) patches, which, equates to 1% of the planning area. Species such as goshawks, Cooper's hawks, sharp-shinned hawks, marten, hermit thrush, brown creeper, and Williamson's sapsucker are associated with mixed conifer habitat, especially the multi-layered canopy conditions found in this habitat type.

Figure 3-4: Overlap of proposed Lava Cast treatment units, LOS and wildlife corridors.



Alternative 1 - No Action

Lodgepole pine: Dwarf mistletoe is prevalent within the lodgepole pine LOS. In the short-term, mistletoe would remain in these stands infesting the understory which would suppress growth of regeneration. The infected overstory trees would weaken attracting more beetles to the stand due to densities within the stand densities. In the long-term, the overstory trees would decline due to the mistletoe and beetle activity, and the area would become at higher risk of a stand-replacing wildfire. Regeneration and growth of the existing understory would be limited because it is already infested with mistletoe. During this time, however, woodpecker species such as the black-backed and three-toed would capitalize on the dead and infected trees for foraging and nesting, and species such as the marten and some birds would continue to use the mistletoe brooms/clumps for denning and nesting.

Ponderosa pine/Mixed Conifer: In the short-term, the individual tree growth within these stands would continue to remain suppressed and at risk of a stand-replacing event. Development of future old growth would be slowed and the old trees within the stands would continue to be stressed, decreasing their longevity. Stands would continue to provide habitat for wildlife species. However, if a stand replacing event does occur, these areas would be void of any future old growth for the next 100+ years, providing no habitat for late seral dependent wildlife species (e.g. goshawk, white-headed woodpeckers, marten). Without an occurrence of a stand-replacing event, these stands would more than likely become diseased due to the existing tree density, and the current multi-storied structure would diminish as large trees died. Remnant old growth within the stands would continue to die, leaving a discontinuous stand of suppressed pine with no overstory/multi-story characteristics.

Some wildlife species would be able to capitalize on such conditions. Species such as the hairy woodpecker can nest and forage in smaller diameter trees. Similarly, the dead and dying trees would augment snags numbers and provide foraging habitat for many woodpecker species, as well as the scattered nesting snag for species that utilize only large (>16" dbh) snags for nesting. For a relatively short time, this increased habitat for woodpeckers would increase prey availability (i.e. the woodpeckers) for forest hawks (especially Cooper's and sharp-shinned hawks).

In absence of a landscape-level disturbance, there would be no measurable additive effects of selecting this alternative with any past, present, or reasonably foreseeable project. LOS habitat is limited within the planning area and the adjacent planning area. In the event of a landscape-level disturbance (e.g. wildfire), potential loss of LOS habitat would be additive.

Alternative 2 – Proposed Action

Table 3-14 displays the proposed treatments to LOS by plant association group (PAG). Commercial thinning could reduce the amount of overstory within the stand, thus reducing the habitat quality for those species associated with a more close-canopied forest (goshawks, Cooper's hawks, sharp-shinned hawks, marten, Williamson's sapsucker, hermit thrush, brown creeper, hairy woodpecker, to name a few). Pre-commercial thinning and natural fuels treatments have the potential to remove the multi-layered characteristic of LOS, thus impacting

the habitat quality for goshawks, Cooper's hawks, sharp-shinned hawks, hermit thrush, and marten. Approximately, 558 acres out of 1,378 acres of LOS habitat (39% of total LOS habitat) would receive treatment within the planning area. The objectives for treating LOS habitat are to improve forest health by reducing mortality, move stands towards better representation of the Historic Range of Variability and improve residual stand health by maintaining/accelerating late structural stage habitat for wildlife. Commercial thinning within current LOS will change the appearance, and likely the function, of the stands from late seral to more of the structure stage 3 (Stem Exclusion/Closed Canopy) and structure stage 5 (Multi-Stratum Without Large Trees). Figure 3-4 spatially displays the current LOS by plant association group that overlaps with the proposed units.

Table 3-15: Summary of Alternative 2 treatments to LOS by plant association group

Plant Association Group	Treatment Type	Acres of LOS Affected	% LOS Treated
Lodgepole Dry	HTH with SPC	38	19
Mixed conifer dry	HTH with SPC HTH without SPC or F HTH with F only HTH with both SPC and F	12 5 0 148	34
Ponderosa pine dry/Ponderosa pine wet	HTH with SPC HTH without SPC or F HTH with F only HTH with both SPC, and F	24 4 143 184	49

HTH - Commercial Thinning/ Variable Density (Alt 3) - Commercial Thin thinning widely (35') around all trees larger than 18" dbh, and in most of the ponderosa pine dominated stands, also removing all the lodgepole pine and white fir. SPC – Non-Commercial Thinning, F – Natural Fuels

Thinning Treatments

Lodgepole Pine (38 acres): Commercial and non-commercial treatments under Alternative 2 in the LOS would result in a more open overstory and understory. Some wildlife use in the area may decline due to the decrease in stand density in the understory as well as the overstory. Current use by those species associated with late structure lodgepole pine (e.g. black-backed, three-toed, and hairy woodpecker) is probably limited due to the current condition and size of the LOS portion of the stand (38 acres) to be treated. As a result of the treatments in the overstory and understory the stands would become more discontinuous; making them even less appealing for cavity excavators because reducing the number of trees per acre would reduce the number of trees used for foraging and/or reduces cover from predators. Treatment would promote stands that are typical in "Understory Reinitiation", that is to say, stands characterized by an overstory canopy that is discontinuous with two or more canopy layers present and two or more cohorts of trees present. Overstory trees may be of small or medium diameter, and understory trees are seedlings, saplings, or poles as defined by the Eastside Screens, 1995. Creating this kind of habitat would benefit wildlife species that can use a variety of forest conditions (openings to mature forest) over a relatively small (<100 acres) area (e.g. red-tailed hawk, chipping sparrow, and olive-sided flycatcher). Improving the health and vigor of these stands may impact black-blacked and three-toed woodpecker habitat suitability the greatest. These species generally capitalize on the existing structural condition of the lodgepole LOS.

However, when the infestation of beetles or mistletoe eventually runs its course and it becomes an open stand with remnant dead trees, the habitat will become unsuitable even for these species due to the lack of cover to protect them from predators if the stands are left untreated as in Alternative 1.

Ponderosa Pine (165 acres): The mixture of lodgepole and ponderosa pine species in these LOS areas creates a denser multi-layered canopy that provides habitat for interior forest species such as the hairy woodpecker, Williamson's sapsucker, and to a lesser degree white-headed woodpeckers and black-backed woodpeckers. These areas also provide nesting and foraging habitat for raptors within the accipiter family (e.g. goshawk, Cooper's and sharp-shinned hawks). Lodgepole pine and understory ponderosa pine thinning proposed for the LOS ponderosa pine stands will maintain some density and result in a reduced risk of catastrophic fire. These treatments will shift the stand type to a predominantly ponderosa pine stand which is a longer-lived species and more resilient to fire, disease and insect infestation. Thinning treatments will promote stand structure to a "Single Stratum with Large Trees". These stands consist of a single dominant canopy of medium sized or large trees. This will result in a patchy distribution between the larger trees, leaving smaller clumps of ponderosa pine trees between the larger overstory trees. One or more age/size cohorts of trees may be present and an understory may be absent or consist of sparse or clumpy seedling or saplings. Grasses, forbs, or shrubs may be present in the understory (Eastside Screens 1995). Ninety-two (92) acres of the ponderosa pine proposed for treatment lies within the Wildland-Urban Interface (WUI) boundary. In the long-term, treatments will maintain habitat for species such as the white-headed woodpecker, Williamson's sapsucker, and northern goshawk, or those that utilize Old Growth ponderosa pine for nesting as well as clumps of patchy regeneration for foraging (especially in the case of the goshawk). Habitat would still be present for the hairy woodpecker, black-backed woodpecker, Cooper's and sharp-shinned hawks, most notably in the areas not proposed for treatment or within clumps retained for other species (e.g. big game).

The treatments, in the long term, would favor species such as white headed woodpecker, northern goshawk, Cooper's and sharp-shinned hawks, and various Neotropical migratory birds that would use both the overstory canopy as well as the residual dense patches.

Mixed Conifer (355 acres): In general, commercial and non-commercial treatments associated with these LOS stands would reduce cover for wildlife and, in the short-term, change use patterns. In stands that have mixed tree species, species such as white fir and lodgepole pine will be left at higher densities between the larger ponderosa pines. White fir and lodgepole pine have a higher tolerance for high stocking levels and therefore would be utilized to provide greater canopy cover between larger ponderosa pine. In the long-term, treatments within these stands would provide healthier stands of mixed conifer, promoting future LOS by reducing stand densities and removing some disease in the overstory (dwarf mistletoe) as well some root disease (*Armillaria ostoyae*) associated with the white fir in the stands. The proposed treatments would not remove all of the overstory and root disease within the stands. Large old structure would be promoted in the overstory with several intermediate stages of white fir, ponderosa pine and lodgepole pine. Over time, complex physical structure would develop through recruitment of larger snags and logs. Interior forest species such as

American marten are dependent on this habitat type at this elevation. Post treatment, the appearance of the stand will meet the Eastside Screens description in that this PAG will consist of multi-stratum with large trees; the canopy will generally be broken or discontinuous with two or more layers present; two or more cohorts of trees will exist with medium and large sized trees dominating the overstory yet trees of all sizes may be present; and horizontal and vertical stand structures as well as tree sizes are diverse.

Natural Fuels Treatments

There are no fuels treatments associated with the lodgepole pine LOS stands proposed for treatment.

Fuels treatments within the late seral ponderosa pine and mixed conifer consist of mowing, underburning, or both mowing and underburning, mowing and handpiling (then burning the piles), or machine piling downed wood. These treatments will reduce the shrub and downed wood densities in the understory in order to reduce the rate of fire spread as well as to increase the ability to keep wildfire on the ground and out of the tree canopy. This will minimize the potential loss of these late seral stands to a high intensity wildfire, but remove some component of habitat for a variety of wildlife species. Different species of Neotropical birds and small mammals are known to use a mature shrub layer for cover and foraging. Mowing and burning these units will reduce the cover and forage base for small ground dwelling mammals and ground nesting birds, as well as forage for big game populations. Initially there may be displacement of these wildlife species due to the reduction of habitat, however as the stands respond to treatment, these species will return. These treatments will shift the ground vegetation to more open areas of grass/shrub components as opposed to a mainly shrub component seen presently. This would provide habitat that would be more suitable for mountain blue bird, mountain chickadee, Townsend's solitaire, chipmunks, and golden mantled ground squirrels. Woolf (2003) reported that some species of rodents (e.g. deer mice, yellow pine chipmunks, and golden-mantled ground squirrels) and birds (e.g. black-backed and hairy woodpeckers, olive-sided flycatcher, and white-breasted nuthatch) were more readily found in the plots that received thinning and prescribed burning.

Forest hawks (e.g. sharp-shinned hawks) are known to use larger downed wood for pluck posts (eating platforms). Marten are known to hunt along piled, larger logs, especially in winter, in order to access hiding prey. Piling and burning of downed wood would remove some of this type of habitat (see Dead Wood and species specific discussions for further analysis).

Alternative 3

This alternative proposes only non-commercial treatments within some of the ponderosa pine LOS; a total of 8% of the current LOS is being proposed for treatment. Effects to the other mixed conifer LOS and lodgepole pine LOS would be similar to those described under the no action alternative.

Table 3-16: Summary of Alternative 3 treatments to LOS by plant association group

Plant Association Group	Treatment Type	Acres of LOS Affected	% LOS Treated
Ponderosa pine dry/Ponderosa pine wet	SPC only F only Both SPC, and F	24 34 40	13

HTH - Commercial Thinning/ Variable Density (Alt 3) - Commercial Thin thinning widely (35') around all trees larger than 18" dbh, and in most of the ponderosa pine dominated stands, also removing all the lodgepole pine and white fir. SPC – Non-Commercial Thinning, F – Natural Fuels

Fuels treatments incorporate mowing, underburning, or hand-piling and then burning – or a combination of such treatments. Effects of these treatments would be similar to those described in Alternative 2.

Overall Alternative 3 would maintain more of the current LOS character than Alternative 2. However, in the ponderosa pine LOS especially, small-diameter thinning and fuels treatments would open up the understory and create a more single-story stand. As stated earlier, this shift towards better HRV representation of this type of old-growth, would favor some species over other species discussed previously for this habitat. Alternative 3 takes a slower approach towards creating this type of old growth than Alternative 2, with fewer short-term effects.

Effects Common to Alternatives 2 and 3

The proposed road closures are not anticipated to have an effect to LOS because of the small amount of LOS being proposed for treatment, and because LOS suitability was not a factor in determining what roads may be closed.

Affects to LOS are similar throughout the larger area of adjacent and nearby timber sale planning areas (East Tumbull, Fuzzy) which have similar LOS habitat distributions. Due to the shortage of LOS habitat in the Lava Cast planning, an analysis of LOS in these other planning areas, in addition to Lava Cast, is needed. Treatments within these areas propose to accelerate tree growth and promote future stands of LOS in the long-term (>30 years). Treatments within these areas will promote resiliency to insects and disease and reduce the risk of catastrophic fire as well as existing LOS. Within the Lava Cast, Fuzzy and East Tumbull Planning areas (144,051 acres total), proposed thinning activities to promote LOS development total approximately 35,100 acres. Treatments to existing stands of LOS are minimal within all of these planning areas (Table 3-17). Treatments are prescribed within these areas for ladder fuels reduction, which reduce the risk of crown fire to these stands. Treatments to LOS within these planning areas collectively total approximately 150-610 acres or 5-19%. The following table summarizes treatment to LOS stands by planning area and thinning treatments to accelerate the production of LOS by planning area.

Table 3-17: Effects to LOS habitat by Alternative.

Effect	Fuzzy	East Tumbull	Lava Cast		
			No Action	Alt. 2	Alt.3
Current amount of LOS habitat	1010 acres SS6/7	496 acres of SS6/7	980 acres SS6, 398 acres SS7		
# acres of existing LOS treated/proposed for treatment	0	13	0	558	98 non-commercial
Trend	Without management, a slow increase but with sustained high risk of loss due to catastrophic disturbances. Objectives for acres of LOS proposed for treatment involve reducing risk to beetle/wildlife mortality.		Slow increase but with sustained high risk of loss due to catastrophic disturbances	Immediate small scale decrease with long-term increase and a marked reduction in risk of loss due to catastrophic disturbances	

There would be no cumulative effects to any designated old-growth areas (OGMAs) because no treatments in any planning area are proposed in these areas. Cumulative effects to LOS habitat as a result of the action alternatives are minimal (14-19% of total LOS in all planning areas being treated; approximately 12-18% of this within the Lava Cast planning area). The effects are minimal because post-treatment these areas are expected to still function as LOS habitat. Additionally, in the long-term, there is projected to be development of LOS that is more sustainable (i.e. within the historic range of variability) that will have cumulative benefits to those species that utilize this habitat.

The project under both Alternatives 2 and 3 proposes to treat 12-18% of LOS. In all cases treatment will have short-term impacts, and long-term benefits. Treatments in all cases will reduce stand densities creating healthier stands and a shift towards better representation of the HRV for old-growth. This will increase habitat for some species and reduce habitat for other species (see species specific analysis for further information). Alternative 2 trades off long-term benefits to LOS in the ponderosa pine type (stands will have a variety of under-story structure that will be less homogenous), and provide better foraging habitat for LOS dependent species such as the white-headed woodpecker, for short-term impacts to forest hawks. Alternative 3 maintains the more LOS in its current condition. Although affects to wildlife populations are immeasurable, treatment will benefit LOS dependent species by maintaining and enhancing the integrity of these stands and promoting their longevity.

EARLY/MID STRUCTURAL HABITATS

Existing Condition

The majority of the planning area is comprised of early and mid seral stands (Table 3-19). There are a few stands exhibiting stand initiation (SS1) and it is completely lacking in Structural Stage 2 (SS2); see page 52 Forest Vegetation Conditions for description. Lodgepole

pine and mixed conifer structure stages 3, 4, and 5, provide hiding cover for big game, as well as habitat for other interior forest species. Some species that use these structure stages are flycatchers, hares, cottontails, goshawk, and at higher elevations the American marten.

Structural Stage 1 provides areas with shrub components such as bitterbrush, ceanothus and manzanita. Not only do these shrubs provide foraging for big game and insectivores but also provide cover for cottontails, hare, squirrels and species of birds such as green-tailed towhees. Within the planning area the majority of the early structural stages have been created by wildfire and past salvage of beetle-infested and diseased trees.

The majority of the planning area in the lower elevation is made up of early and mid seral ponderosa pine. These stands are regeneration following harvest during the early 1900's. Much of this is now classified as "black bark" ponderosa pine and some of the areas have been thinned during the 1990's. Bitterbrush dominates the understory within these stands, and as a result, these lower elevation ponderosa pine stands provide habitat for mule deer as they transition from summer to winter range. The stands also provide good nesting and foraging for raptors such as the Coopers' hawk and sharp-shinned hawk.

Table 3-18: Early and Mid Structural Stages (SS)* Acreages.

PAG	SS1-Early	SS3-Early	SS4-Mid	SS5-Mid	Total by PAG
Lodgepole pine dry	852	1,300	3,361	916	6,429
Mixed conifer dry	465	2,540	1,627	1,347	5,979
Mountain hemlock dry	0	14	0	0	14
Ponderosa pine	1,397	2,749	8,627	6,412	19,185
Totals by SS	**2,714**	**6,603**	**13,615**	**8,675**	

*SS 1 = Stand initiation; SS 3 = Stem Exclusion: Closed Canopy; SS 4 = Understory Reinitiation
SS 5 = Multi-story without large trees

Alternative 1 - No Action

No thinning would occur to the approximately 30,591 acres of early and mid seral habitat. Short-term habitat for species that utilize these young dense stands will remain unchanged (e.g. deer hiding cover). In the long-term, stands will remain dense and the nesting and foraging habitat that these stands once provided for raptors such as the Coopers' and sharp-shinned hawks will grow increasingly susceptible to catastrophic disturbances. Future LOS development will be slow and in isolated patches rather than over large areas of the landscape.

Thinning Treatments: Alternatives 2 & 3

Effects to early and mid structural stages are essentially the same between the action alternatives for the Lodgepole and Mixed Conifer PAGs. There will be different silvicultural prescriptions in the Ponderosa pine PAG under Alternative 3.

Lodgepole Pine: A majority of the treatments occurring in lodgepole pine are within SS4, mid-seral habitat condition. Treatments include commercial and non-commercial thinning. These stands are classified as Understory Reinitiation which is defined as having: 1) a

discontinuous overstory canopy with two or more canopy layers present, 2) two or more age/size cohorts of trees, 3) overstory trees may be poles or of small or medium diameter, and 4) understory trees are seedling, saplings, or poles. The proposed commercial and non-commercial thinning will reduce the density of the stands and make them more open. This will increase habitat for ground foraging birds and create habitat that could be utilized by foraging raptors such as red-tailed hawk. Within these stands at high elevation, snow-shoe hare utilize the seedling and sapling components and this habitat would likely be reduced as a result of non-commercial treatments. Martens also utilize these stands at higher elevations for dispersal and some foraging. Dispersal habitat in the short-term would be reduced, but the reduction in stem densities will allow for a healthier stand of long-term habitat that would provide dispersal, foraging, and resting habitat.

Ponderosa Pine: The majority of treatments within the planning area occur within SS4 and 5 stages of ponderosa pine. The planning area is mostly comprised of this habitat type due to past harvest during the early 1900's. Many of these stands have been thinned in the late 1980's and early 1990's, but are still densely stocked. Proposed thinning in these stands will likely result in a single story stand with very few trees in the understory. Treatments will promote bitterbrush and grass production that will benefit deer, elk, and ground nesting birds such as Townsend's solitaire that utilize the area seasonally. Nesting habitat for sharp-shinned and Cooper's hawks is still present, but there a less dense understory as a result of fuels reduction treatments which would reduce the amount of habitat for prey species. Over the long-term, pockets of habitat for prey species would increase as development of LOS increases and the risk of losing this habitat to stand replacing fire decreases. By moving the ponderosa pine stands towards HRV and single-storied with large trees condition, habitat for sharp-shinned and Cooper's hawks will not likely be as widespread as it is currently. Habitat would still occur in the nearly 2/3 of early and mid-seral habitat not treated. Conversely, habitat for white-headed woodpeckers and other species that use large ponderosa pine trees and snags (e.g. some bat species) would increase and become more widespread.

For Alternative 3, the objectives are the same as above, however commercial and non-commercial thinning will be completed with variable density thinning. These treatments will leave a mosaic of densities in the ponderosa pine habitat type by leaving patches of unthinned trees and removing other competing species such as lodgepole pine and white fir thereby creating openings of up to two acres in size. This type of thinning is more valuable to species such as the sharp-shinned and Cooper's hawk, and landbirds that utilize a more multi-story, patchy distribution (e.g. thrushes) because the resulting clumpy distribution of trees will provide nesting and foraging habitat. This type of treatment will still likely benefit the development of white-headed woodpecker habitat.

Mixed Conifer: These stands are in the higher elevation of the planning area. Treatments prescribed within these stands are similar to that in the LOS; however these stands do not have a fully developed overstory. Stands are comprised of ponderosa pine, white fir, and lodgepole pine. SS4 and 5 provide habitat for interior forest species such as the American marten, northern goshawk, and black-backed woodpecker where there are inclusions of lodgepole pine. Proposed treatments (commercial and pre-commercial thinning) in these historic ponderosa pine-dominated stands will favor ponderosa pine due to its fire tolerance but any large white fir

or lodgepole pine will also be retained. Thinning will highlight the large white fir in the stand, but will reduce crown interaction/overlap between the three species thereby reducing risk of crown fire. The overall objective within these stands is to reduce stand densities focusing on removing disease and beetle infestation. In the short-term, habitat will be reduced for the above mentioned species by opening the canopy and removing trees that provide habitat. However, in the long-term, stands will have a better chance of developing into LOS and the residual stand densities will provide habitat in the interim.

Natural Fuels Treatment: Alternatives 2 and 3

Fuels treatments consist of combinations of mechanical- or hand-piling and mowing in the lodgepole pine/mixed conifer and additionally underburning in the ponderosa pine. That is to say, fuels treatments may include mowing and piling, mowing and underburning, just mowing, or just underburning. Approximately 6,000 acres (63% of the early and mid seral stands proposed for treatment) will receive some form of fuels treatments. Treatments will consume some coarse woody materials (especially material <5" in diameter) as well as reduce grasses, forbs, and shrubs that provide habitat for ground dwelling mammals as well as ground nesting birds. Treatments will reduce habitat for these species in the short-term, but will provide a mosaic of grasses and shrubs that are healthy and more vigorous. Woolf (2003) found that in cases of thinning and underburning, the presence of some bird species and small mammals increased.

As stated in the LOS discussion, within the surrounding landscape, adjacent and nearby to the planning area, there are approximately 35,100 acres proposed or are currently being implemented with commercial and non-commercial thin. These treatments are associated with the Fuzzy, East Tumbull, Lava Cast planning area projects as well as the Lava Cast TSI CE. These treatments propose to move the landscape into the historic range of variability and enhance long-term LOS habitat by accelerating stand development and reducing the risks of catastrophic disturbances such as wildfire and beetle infestation. Much of the Fort Rock portion of the Bend-Fort Rock Ranger District is comprised of black bark (early to mid-seral) ponderosa pine and over the preceding two decades (1984-2005) in the adjacent 5th field watershed, a total of 14 stand replacement fires larger than 25 acres have burned, on average, 1400 acres per year. If the current annual rate of loss continues for the next 50 years all of the forested land in the watershed will have been burned over. The objectives for these stand types are to not only produce future LOS ponderosa pine, which is a fire resistant species, but also reduce the susceptibility of lodgepole pine stands to beetle infestation, and decrease the risk of disease in the mixed conifer (white fir-associated) stands. In the past 10 years, fire frequency has been similar within the 5th field watershed (Lower Little Deschutes) associated with the Lava Cast planning area as that in the adjacent watershed (Pilot Butte Watershed). Without treatment and with the predicted increased frequency of stand replacing wildfire, the development of future LOS will not likely occur.

The proposed treatments have additive, long-term benefit to the planning area and adjacent planning areas in the reduction of wildfire risk and improved development of LOS habitat (see LOS discussion).

There are various wildlife species associated with these early and mid seral stands within the planning area. The majority of treatments occurs within the mid-seral stands and, due to the stage of development, provides the most diversity and variability of wildlife habitat. The primary objective for treatments within these stands are to reduce the risk of insects and disease, reduce the risk of stand replacing wildfire, and promote the development of future LOS. The planning area is dominated by early and mid seral stands, and with the current trends of insects, disease, and fires on the Deschutes National Forest, treatments are essential to provide future old growth. Effects to species previously mentioned will be minimal in the short-term due to the amount of residual trees left through prescriptions (up to 90 trees per acre depending on PAG) as well as provision for structure (see dead wood discussion). Long-term effects will be beneficial to these species through the production and distribution of habitat across the planning area, and the acceleration of development of these stands. Proposed road closures, in the long-term, may create more early and mid-seral habitat as the road beds are reclaimed by vegetation. Although effects to wildlife populations cannot be accurately measured there will be a net benefit in the production of long-term wildlife habitat that existed historically and a benefit to habitat sustainability.

SNAG/COARSE WOODY MATERIAL/GREEN TREE REPLACEMENT

Snags

Numerous species of animals use snags and coarse woody material (CWM) for foraging, nesting, denning, roosting and resting. A snag is defined as a dead tree that is over 10 inches dbh and taller than 10 feet. Coarse woody material is considered to be dead and down material that is greater than 5 inches in diameter (Ohmann and Waddell, 2002; Mellen et al 2006). The most notable species that use snags and CWM are the primary cavity nesters (e.g. woodpeckers and nuthatches) that excavate nest cavities in decayed wood in standing trees. Vacated cavities are subsequently used by many other birds and small mammals (i.e. secondary cavity users). Selected wildlife species known or suspected to occur in the Lava Cast planning area that utilize these habitats include the flammulated owl, northern pygmy owl, white-headed woodpecker, black-backed woodpecker, Williamson's sapsucker, pygmy nuthatch, brown creeper, mountain bluebird, American marten, western small-footed myotis, long-eared myotis, and long-legged myotis. Refer to Table 3-13 for species management status and occurrence within the planning area.

Snag and CWM habitat conditions were analyzed and compared using current direction and more recent research, including the DecAID Advisor (Decayed Wood Management Advisor; Mellen, et al 2006). The DecAID Advisor is a planning tool intended to help specialists manage snag and log levels best suited for their management area and associated wildlife species. This tool uses the best available science and most recent research for species dependent on snags and coarse woody material. Current direction bases snag density standard and guidelines on "maximum population potential (MPP) or biological population potential (BPP)". Rose et al (2002) determined this to be a flawed technique, and many of its authors contributed to the DecAID Advisor. The DecAID Advisor, however, does not change current direction, nor does it directly address whether a project is in compliance with current direction. Therefore, snag and CWM densities as presented in the DecAID advisor, as well as in the

current direction are analyzed and compared in relation to potential effects from the proposed actions.

The following tables detail the proportions of the different plant association groups and structural stages within the Lava Cast planning area.

Table 3-19: Representative Plant Association Groups within the planning area and area sampled for dead wood (1995 stand exam data).

Plant Association Group (PAG)	Percent of PAG within the planning area	Percent of PAG within the proposed treatment units	Percent of PAG sampled for dead wood
Lodgepole Dry	19 (6580 ac)	26-27 (1728-1810 ac)	20 (1340 ac)
Ponderosa Pine Dry	47 (19031 ac)	30 (5701-5664 ac)	36 (6780 ac)
Mixed Conifer Dry	18 (6386 ac)	22-23 (1404-1476 ac)	48 (3049)
Mountain Hemlock Dry	< 1 (14 ac)	0 (0 ac)	
Other (Rock, Lava, Cinder)	9 (3003 ac)`	0 (0 ac)	

Table 3-20: Representative structural stages by plant association group.

Structural Stage	Percent of Plant Association Group (% of forested area)		
	Lodgepole Pine	Ponderosa Pine	Mixed Conifer
Stand Initiation	2 (802 ac)	2 (554 ac)	1 (382 ac)
Stem Exclusion	4 (1300 ac)	8 (2749 ac)	8 (2540ac)
Understory Reinitiation	10 (3361ac)	26 (8627 ac)	5 (1627 ac)
Multi-stratum without Large Trees	3 (916 ac)	19 (6372 ac)	4 (1347 ac)
Multi-stratum with Large Trees	0.5 (165 ac)	2 (515 ac)	1 (340 ac)
Single Stratum with Large Trees	0.1 (36 ac)	1 (214 ac)	0.4 (150 ac)
Total (percentages do not equal 100 due to rounding)	20 (6580 ac)	58 (19031 ac)	19 (6386 ac)

Table 3-21: Reconciling of terms used for structural stages in DecAID and the Historic Range of Variability analysis (HRV).

Habitat Type	DecAID Structural Stage	HRV Structural Stage
Ponderosa Pine/ Douglas-fir (Ponderosa pine dry and Ponderosa pine wet Plant Association Groups)	Open Small/Medium Large	Stand Initiation (554 ac) Stem Exclusion, Understory Reinitiation, Multi-stratum without large trees (17,748 ac) Multi-stratum with large trees, Single-stratum with large trees (729 ac)
Habitat Type	**DecAID Structural Stage**	**HRV Structural Stage**
Eastside Mixed Conifer/Blue Mts. (Mixed conifer dry Plant Association Group)	Open Small/Medium Large	Stand Initiation, Stem Exclusion (2922 ac) Understory Reinitiation, Multi-stratum without large trees (2974 ac) Multi-stratum with large trees, Single-stratum with large trees (490 ac)
Lodgepole Pine (Lodgepole pine dry Plant Association Group)	Open Small/Medium	Stand Initiation, Stem Exclusion, Understory Reinitiation (5463 ac) Multi-stratum without large trees, Multi-stratum with large trees, Single-stratum with large trees (1117 ac)

The wildlife data within the specific habitat types displayed in DecAID were used to analyze the current condition within the planning area in its relation to providing habitat for MIS species. In characterizing the landscape, several links within the DecAID advisor were used including "Relative potential for dead wood within wildlife habitat types as influenced by fire regime, sub-series, and topographic position" found in the DecAID Implementation Guide; and the 2003-2005 Aerial Insect and Disease Survey maps. Densities are given in the form of wildlife species tolerance levels at the 30%, 50%, and 80% levels. For example, assuming normally distributed data, if 20% of a species' nests were in areas with > 18 snags/acre, then 80% of the nests were found in areas with 0-18 snags/acre, and 18 snags/acre is the *80% tolerance level*. Information in regards to existing snag and log densities and sizes were available through stand exam data and other similar sources (CVS plots).

The habitat types found within the Lava Cast planning area and adjacent planning areas are within a high frequency fire regime. Topography is generally flat to moderate slopes with the exception of the buttes (e.g. Sugar Pine Butte). This suggests that the relative potential levels of dead wood would be low to moderate. The more moderate levels are found in the higher elevation mixed conifer and lodgepole pine habitat types found on the eastern portion of the planning area. It also suggests that the Lava Cast planning area would tend to provide habitat at the lower wildlife tolerance levels (30%-50%).

Table 3-21 is a summary of the current snag levels (determined from 1995 stand exam data) followed by a summary of the wildlife data. Selected species are MIS species that may be found in the planning area and displayed by habitat type, from the DecAID advisor.

Table 3-22: Existing snag information for the Lava Cast planning area.

Plant Association Group/ Habitat Type	Average snags/acre 10-19.9" dbh	Average snag dbh of those snags 10-19.9" dbh	Average snags/acre ≥20" dbh	Average snag dbh of those snags ≥20" dbh
Ponderosa Pine Dry/ Ponderosa Pine Douglas-fir (PPDF)	0.78	13"	0.2	28"
Ponderosa Pine Wet/ Ponderosa Pine Douglas-fir (PPDF)	2.9	12"	0	0
Mixed Conifer Dry/ Eastside Mixed Conifer/ Blue Mts (EMC_EB).	3.3	12"	0.5	25.5"
Lodgepole Pine Dry/ Lodgepole Pine (LP)	0.87 (10-11.9")	10"	1.2 (> 12")	16"

Based upon the information in Tables 3-23 and 3-24, there is a lack of >20" dbh snags, and current snags densities are providing habitat at the 30 % tolerance level, especially for the species associated with the PPD habitat type which dominates not only the Lava Cast planning area, but also the proposed treatment areas.

In looking at the relation of snag dbh and tolerance level, according to the inventory tables within each of the habitat types these species tend to select for snags >20" for nesting and/or roosting/denning across all of the habitat types, with the smaller snag sizes being used at the lower tolerance levels. Smaller diameter snags were more often used for foraging as reflected in the 10-20"dbh range of snags being in the 80% tolerance level for foraging.

The existing low density of snags coupled with the importance of large diameter snags to many of the MIS species, emphasizes the need to retain all existing snags as possible in the planning area, as well as creating conditions that will favor the recruitment of large snags.

Using the studies and information within DecAID, it is entirely expected and realized within this analysis area that distribution of snags will be clumpy (i.e. some areas have no snags while others have many snags). Since most of the planning area falls within the small/medium tree types, the clumps of snags would be expected to be small (2-5/acre) with the majority of these snags being less than 20" dbh. The large tree type would have more of the larger snags. The 2003-2005 Insect and Disease maps show potential outbreaks of mountain pine beetle in ponderosa and lodgepole pines occurring within the eastern portion of the planning area and more onto the NNVM, with smaller patches scattered into the southern portions. These areas may provide the higher density clump of snags utilized by some species (e.g. Black-backed woodpecker).

Table 3-23: Snag densities for wildlife species at 30, 50, 80 percent tolerance level for snags > 10"dbh and >20"dbh based on wildlife data in DecAID.

	30% Tolerance level (#snags/acre)		50% Tolerance level (#snags/acre)		80% Tolerance level (#snags/acre)	
	≥10"dbh	≥20"dbh	≥10"dbh	≥20"dbh	≥10"dbh	≥20"dbh
PPDF						
Black-backed woodpecker (BBWO)	2.5	0	14	1.4	29	6
Cavity-Nesting Birds (CNB)	1	0	5	1	10	3
Long-legged Myotis (LLMY)	4		17	-	37	
Pygmy Nuthatch (PYNU)	1	0	6	2	12	4
White-headed woodpecker (WHWO)	0.3	0.5	2	2	4	4
Williamson's sapsucker (WISA)	14	3	28	9	50	17
Current Direction for the Ponderosa Pine[1]	***3***	***1***				
EMC_EB						
American marten (AMMA)	12	4	13	4	14	4.5
BBWO	2.5	0	14	1	29	6
LLMY			10			
PYNU	1	0	6	2	12	4
WHWO	0.3		2	1.5	4	4
WISA	14	3	28	9	50	17
CNB				2		
Current Direction for Mixed Conifer	***5-9***	***4***				
LP						
AMMA	12	4	13	4	14	4.5
Current Direction for LP	**6**	***N/A***				

1 Current Direction (Screens) is provided by habitat type and densities >10" and >20". It is not broken down into tolerance levels but rather represents a 100% biological potential which has been determined to be a flawed technique (Rose et al 2002)

This distribution information suggests that most of the habitat types in the Lava Cast planning area would not have the densities within each area to meet the 80% tolerance level for many of the MIS species, but may have more or less even distribution of smaller densities or varying densities of snags with occasional high density pockets of snags. These distributions would likely be most suitable for wildlife species that select for a more even distribution of snags (e.g. white-headed woodpecker) than those that capitalize on dense pockets of snags (e.g. black-backed woodpeckers).

In comparing the existing data with the DecAID data, there is snag habitat being provided albeit at lower levels than may be optimal for many MIS species. The planning area may be capable of providing more habitat than is currently present but is not likely to sustain habitat at the 80% tolerance level. Populations may remain limited due to the current availability of

habitat. As management trends towards the historic range of variability and an increase in large ponderosa pine habitat, large clumps of snags as a result of beetle-kill or stand-replacing fire may become a more uncommon feature in the long term.

Coarse Woody Debris (CWM)

In order to analyze downed log habitat (CWM), two sources were used. DecAID was used to compare the average diameters of logs used by wildlife (often black, bear, marten, and ant species) and distribution of CWM material over the planning area. Eastside Screens direction specifies pieces per acre of certain sizes to be retained according to habitat type. The following tables compare the existing levels with these two measurements.

Table 3-24: Comparison of existing CWM and directed levels. Estimates of percent cover are given in order to compare with information in DecAID Advisor.

Habitat Type	Average diameter of CWM 10-20”	Average length of CWM 10-20”diameter	Density (pieces/ac) of CWM 10-20”	Average diameter of CWM >20”	Average length of CWM >20”diameter	Density (pieces/ac) of CWM >20”	Percent cover
Ponderosa Pine Dry/ PPDF	13”	19 ft.	4	24”	21 ft	1	0.4-0.5
Ponderosa Pine Wet/ PPDF	13”	28 ft	5	21”	23 ft	0.4	
Direction for Ponderosa Pine	**12**	**>6**	**3-6**				**0.3-0.9**
DecAID level*							**0.9-8.5**
Mixed Conifer Dry/ EMC_EB	12”	25 ft	4	23”	29 ft	0.3	0.45
Direction for Mixed Conifer	**12”**	**> 6 ft**	**15-20**				**1.5-3.4**
DecAID level							**2-6**
Lodgepole Pine Dry/ LP	14 (> 8”)	21 ft	5	-	-	-	0.5
Direction for Lodgepole Pine	**8”**	**>8 ft**	**15-20**				**0.8-2.1**
DecAID level							**2.6-16**

*The information for % cover levels from DecAID was taken from the inventory data. The wildlife data source either had limited sources (PPDF – one species); caveats on its use (EMC_EB); or source was from within an active beetle outbreak (LP). The ranges given reflect the 30-80% tolerance levels for all the structural stages.

Based on the Screens direction, the planning area is currently meeting CWM guidelines in the ponderosa pine habitat type. Overall, it appears CWM levels are currently deficient in the mixed conifer and lodgepole pine habitat types; however, there are areas where there are high density clumps of downed logs. A field review of units where grapple piling was being

proposed in the lodgepole and mixed conifer habitat types, showed CWM densities between 1.2-5.9% cover (see figures 1-4); this would then meet current directed levels. Whether considering the stand exam data or field verification, the mixed conifer and lodgepole pine habitats are currently within the 30-50% tolerance levels when compared to the inventory data in DecAID. This suggests that there is a likelihood that a particular individual of a species that uses downed wood, say a marten, would be found using the stand 30-50% of the time.

Fig. 3-5: Unit 156 Example of desired CWM density standards required by the Eastside Screens direction.

Fig 3-6: Unit 247 example of heavier CWM cover above Screens direction.

Existing average diameters in the planning area can meet the 50-80% tolerance levels in the ponderosa pine and mixed conifer habitat types. For the lodgepole pine habitat, current diameters provide the 30% tolerance level. Downed log habitat for black bears and marten (foraging and denning) is currently limited in the planning area. Distribution information within the inventory data of DecAID shows that the large log diameters selected for by these species are naturally rare on the landscape; often found on no more than 40% of the area in the best habitat to <4% in the lodgepole pine habitat. Often species that utilize large downed logs also utilize large snags, limited availability of either or both features, reduces the quality of habitat available.

Green Tree Replacements (GTRs)

Green tree replacements are trees retained, or managed through time, to provide snag or CWM habitat at some point in the future. The treatment unit is the area of accountability for meeting GTR objectives (Deschutes National Forest Wildlife Tree and Log Implementation Strategy [WLTL], 1994). The objective for treatment units is to provide patches of habitat, or GTRs in a distribution pattern suitable for home range needs of primary cavity excavators (WLTL 1994). According to the WLTL, green tree replacements do not need to be provided on every acre in the forested ecosystem. A mosaic distribution across the landscape maintaining viable populations and ecological functions is the desired condition. The desired condition is based on the assumptions that: 1) deficits or surpluses, whether natural or related to past management activities, will continue to be part of the landscape; 2) treatment units will be designed to meet WLTL objectives each entry or treatment; and 3) that some treatment units will not provide WLTLs due to preference given to other resource issues. The Eastside Screens direction requires all sale activities (including intermediate and regeneration harvest in both even-age and uneven-age systems, and salvage) to maintain GTRs of >21 inches dbh, or the representative dbh of the overstory layer if less than 21 inches, at 100 percent maximum potential population levels (MPP) of primary cavity excavators. The 100% MPP is estimated to be 4 snags/acre for ponderosa pine habitat types, 9-13 snags/acre for mixed conifer, and 6 snags/acre for lodgepole pine habitat types. Table 3-25 illustrates the number of GTRs per acre that would be needed to meet current direction assuming the average diameter of the stands at least 9 inches.

Table 3-25: Estimated* GTRs (trees per acre or "tpa") required to meet current direction by habitat type assuming a residual average stand diameter of 9 inches and comparison to upper and lower management zones.

PAG	Directed GTR density	Tree density range based on lower and upper management zones
Ponderosa Pine	25	87-180
Lodgepole Pine	33	74-140
Mixed Conifer	25	134-200

Based on the figures in Table 3-24 and considering the Upper and Lower Management Zones for the stand types (Connectivity discussion), GTR levels can be achieved while also reducing the beetle risk/susceptibility.

Alternative 1 - No Action

The No Action alternative would maintain snag, CWM and green tree replacement habitats in the current condition during the short-term (<20 years). However, natural disturbances such as wildfire, wind events, insect and disease pathogens, and lightning would recruit snag and CWM habitat through time in the planning area. High tree density in some of the ponderosa pine stands would not only retard the development of large diameter (>21") ponderosa pine trees and future snags but also may hasten the development of smaller diameter snags and CWM as a result of mortality from bark beetles or fire. This would benefit MIS cavity-nesting species that utilize smaller snags for nesting and provide for increased foraging opportunities for many of the MIS species. Large snags and downed logs would continue to be limited and those species that select for these habitat components (e.g. black bear, marten, bats, white-headed woodpecker and Williamson's sapsucker) would continue to have limited populations within the planning area. The result of an increased fire risk due to existing high fuel loads would put these limited habitat features at risk. If a high intensity wildfire did burn through the planning area, habitat for many of the MIS species would be lost; although there would be a temporary increase in snags for woodpeckers.

Under the No Action alternative, to retain the current forest habitat conditions also means maintaining an increasingly higher risk of losing the habitat due to bark beetles and/or wildfire mortality. Snags created through these means will be <21" because most of the existing trees are smaller, and subsequently the logs created by these snags falling over will be smaller. It will take many decades for large snag and log structure to develop within the planning area and adjacent planning areas.

Past wildfires (18 Fire, Skeleton Fire, Evans West) have demonstrated what can happen to the existing habitat. In areas that naturally have a frequent understory burning regime with only pockets of tree mortality, such as the ponderosa pine associations within Lava Cast, there would be changes in bird communities after a wildfire with normally a relatively quick recovery to the community seen before the fire (Smith, ed. 2000). In the planning area, this type of regime of frequent understory burning has not occurred partly due to aggressive fire suppression efforts in the past. The indirect result of a wildfire burning in the planning area now may be a slower recovery of bird communities. The cumulative effect of an increased risk to wildfire (e.g. the no action alternative) is the increased risk of a dramatic shift of habitat and the associated bird, and other animal communities; (i.e., forested community to a mosaic with grass or shrub openings).

Alternatives 2 & 3

The action alternatives do not propose commercial harvest or salvage of any snags. Removal of any coarse woody material (CWM) of the sizes utilized by wildlife (>5-8") in excess of Screens direction would occur over 981 acres (in units ranging in size from 22-132 acres). In

the case of snags, with the exception of perhaps the occasional felling of snags that pose a hazard to human safety during timber sale operations, commercial harvest treatments would have no direct effects. Commercial harvest would directly affect green tree replacements (GTR) by reducing the number of trees in treatment units. However the units would retain enough GTRs to exceed currently directed levels and meet the 30-50% tolerance level of wildlife habitat use in all types (Table 3-26). It is estimated that in units receiving widely spaced thinning 30-50 green trees per acre would be retained with a minimum of 9" dbh. In units receiving more tightly-spaced thinning, 40-90 green trees per acre would be retained that are at least 9" dbh. Alternative 3 treats more acres with a widely spaced thinning prescription than Alternative 2 (480 acres versus 499 acres). Alternative 2 would leave more GTRs across the planning area. Alternative 3 employs a more variable thinning that may result in clumps of green trees around snags, or in the long-term, clumps of snags. This may result in a more variable distribution of snags in the future. Precommercial thinning would have no direct effect on snags or CWM. Each alternative treats the same amount of acres with a regeneration harvest prescription (414 acres). These prescriptions are within the lodgepole pine habitat type, and would affect habitat for species such as the black-backed and three-toed woodpecker and the marten. Treatment of mistletoe within the stands is part of the thinning prescriptions. This can specifically impact species that utilize mistletoe brooms such as marten, and some bird of prey species (e.g. sharp-shinned hawks). Precommercial thinning would reduce the number of smaller diameter GTRs in treated units but would likely not affect the overall levels, because the effects of this type of thinning would be eliminated by the time snags are created.

Prescribed underburning in the ponderosa pine and mixed conifer habitat types would have direct effects to snags and CWM. Direct effects include a reduction in the amount of CWM either by length and diameter reduction or overall abundance. Prescribed burning, depending on burn intensity, may result in a reduction in the number of existing snags. Mortality of larger diameter green trees (>15") may also occur as a result of prescribed fire, supplementing snag numbers in the short-term and CWM over the long-term. The exact number of snags and CWM lost to prescribed fire or recruited from prescribed fire is unknown but with mitigation measures the overall amount of dead wood would likely remain at directed levels. Burn objectives and mitigations would reduce the loss of snags and CWM. Incidental mortality of GTRs may occur but is expected to be minimal. Post treatment, the numbers of GTRs would likely exceed minimum management levels. Mechanical shrub treatments would have no direct effects to snags or CWM.

Indirect effects of the action alternatives include decreasing the recruitment of smaller snags and CWM by removing trees, thereby reducing the risk of mistletoe infection and mortality caused by bark beetles or wildfire. Both alternatives propose the same amount of fuels reduction treatments. Although the recruitment of dead wood habitats would slow, silvicultural treatments (commercial and precommercial thinning) would provide beneficial indirect effects by promoting faster growth of GTRs, ultimately providing larger diameter snags and CWM. Natural fuels treatments (prescribed underburning and mechanical shrub treatment) would provide the indirect benefit of reducing fire risk and maintaining these habitats over the long-term. These effects are anticipated to be minimal to GTR however, because more than two-thirds of the planning area will remain untreated. Areas of high tree densities remain, with high downed wood densities and beetle activity that would likely

continue to provide snags and foraging opportunities, albeit at lower overall levels than the no action alternative.

With a history of timber and fire management the Lava Cast area and the federal lands adjacent to it, have limited large snag, and log habitat. The area is dominated by stands of even-aged, uniform forest canopy where the trees are 50-80 years old and average less than 21" in diameter. The lack of large snags and logs makes habitat conditions for some cavity-nesters (e.g. white-headed, Williamson's sapsucker, and black-backed woodpecker) marginal.

Table 3-26 displays the current snag densities within the Lava Cast planning area and adjacent planning areas, and a portion of the Newberry National Volcanic Monument (NNVM) in order to illustrate an area where higher dead wood densities may be attainable due to land use allocation objectives.

Table 3-26: Comparison of the directed and existing snags densities in the Lava Cast planning area and adjacent planning areas.

	Snags >10" dbh per acre by Habitat Type*		
	PPDF	**LP**	**EMC**
Current Direction	3 1 ≥ 20" dbh	6	5-9 4 ≥ 20" dbh
Lava Cast	0.78-2.9 0.17-0.5≥ 20" dbh	2.07	3.3 0.5≥ 20" dbh
18 Fire	23.5 2.3≥ 20" dbh	N/A	N/A
Newberry National Volcanic Monument - South half	7.5 1.2 ≥ 20" dbh	11.3 0 ≥ 20" dbh	N/A

*Represents an average of the snag densities within each of these planning areas.

Over the larger area there are pockets where snag densities exceed the directed levels (18 Fire and NNVM) but levels of large snags are still low. Existing snag levels only attain the 50% tolerance level in the NNVM, an area outside of scheduled timber harvest, and the 18 Fire, a more recent wildfire that has been partially salvage logged.

The cumulative effects of the proposed, current, past, and foreseeable actions, including continued fuels treatments in the urban interface (Fuels CE) and timber stand improvement (TSI CE), would be a reduction in the amount and recruitment of smaller snags and CWM within the planning area and over the landscape due to stand treatment prescriptions that would improve the health of the stands and make them less susceptible to beetle-induced and/or wildfire mortality. This may affect the density of dead wood in the small/medium structure stages, but is not expected to substantially change the current ratios seen over the analysis area. There is 648 acres of girdling 15" dbh trees or felling <9" dbh trees proposed under the Lava Cast TSI CE that will minimally add snags and logs. One benefit of thinning treatments is that in the long-term (>30 years), reduced tree competition would allow for accelerated tree growth resulting in snags and CWM, as trees grow, die, and fall, that would be of the larger diameters

(20" or more), thereby improving the density of large snags and logs available on the landscape. It is this large size structure that is currently the most limiting.

Dead wood recruitment has also been or will be lost due to infrastructure improvements (Hwy 97 interchanges and road relocations) and ongoing firewood cutting (McKay firewood cutting area) that allows the removal of standing dead and down lodgepole pine. The additive effects of the proposed action when considering these other actions are minimal. In the event of a wildfire, although potentially in a high intensity fire, dead wood is created, however the other associated habitat features that dead-wood associated species utilize such as cover is lost.

In the short-term, dead wood (snags and logs) levels would continue to decline over the planning area largely due to ongoing projects (e.g. firewood cutting; infrastructure improvements adjacent to National Forest land) in conjunction with natural fuel treatments to limit fuel loadings. Although the exact effects of this decline are immeasurable to MIS cavity excavator and secondary cavity using species, it is expected that their populations will remain limited. Measures to retain as many snags and logs as possible will help mitigate some of these short-term effects. In the long-term, improved growth of trees and retention of adequate GTRs will help ensure a more stable supply of the larger snags and logs that the planning area is currently lacking, and likely has lacked since the early 1900's. The planning area, because it emphasizes not only timber production, but also community protection in the WUI, over other resource values, may never provide large areas with high density of snags, especially in the lodgepole habitats. This will possibly continue to limit populations of black-backed and three-toed woodpeckers.

MANAGEMENT INDICATOR SPECIES

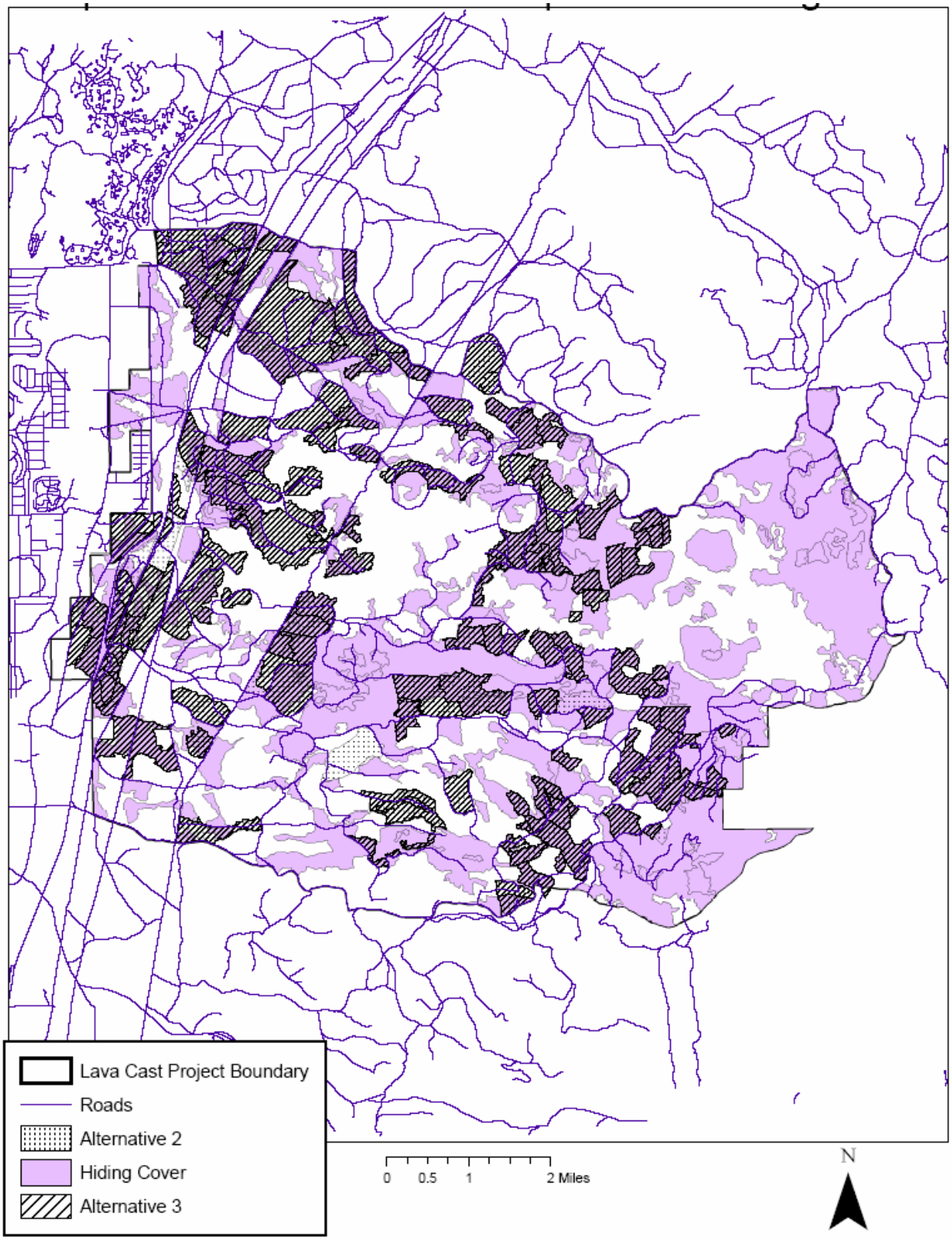
BIG GAME
Existing Condition

Deer: The planning area consists of both summer and transition range for mule deer. The North Paulina mule deer herd uses this as part of their transition range between winter and summer range. The majority of the biological transition range in the planning area is within the lower elevations of ponderosa pine on the west side of the planning area. Cover within transition range generally has an aspect of thermal cover associated with it. Thermal cover is not generally a limiting factor within the transition range in the planning area. That is to say, deer utilize the planning area's transition range at times when thermal cover is not a limiting factor for survival. However, transition range within the planning area is valuable for foraging after the rut and prior to deer entering winter range. In general, the majority of transition range is in "black bark" ponderosa pine stands that are, on average, 60 to 80 years old and does not provide favorable amounts of hiding or thermal cover in this area. Also, stand densities are high enough that bitterbrush production in the understory is marginal due to shading. This is to say, that the stands are dense enough to reduce the amount of shrub and brush cover (that contribute to forage and some hiding cover) but the canopy closure is too low and the tree trunks bare of lower limbs (dead or alive) to provide quality thermal or hiding cover. In transition range, forage and hiding cover are more valuable than thermal cover. In south central Oregon, Peek et al (2000) showed that in ponderosa pine stands from 1953 to 1988 as

the crown cover increased, shrub biomass decreased. This is what is potentially occurring under the black-bark stands within the planning area.

Hiding cover is distributed throughout the planning area, although the largest patches of cover are within the eastern part of the planning area. Overall, animals can utilize the majority of the openings and still have access to cover for security. The planning area contains approximately 17,726 acres of hiding cover, which is approximately 54% of the vegetated area within the planning area. However, open roads reduce habitat effectiveness and the density of open roads in the planning area is approximately 3.5 miles per square mile. These roads cause habitat fragmentation and disturbance, adding additional stress to the animals. Level of disturbance increases with the use and improvement of the road, that is to say paved roads and highways cause higher levels of disturbance than dirt forest roads, but all roads contribute to disturbance. Connectivity corridors, designed for this planning effort, also serve as hiding cover and can function to move animals in and out of the area. There are some barriers such as residential areas associated with the western boundary of the planning area that affects migration into the area.

Figure 3-7: Overlap of Deer hiding cover and proposed Lava Cast treatment units.



Elk: There is a small herd (80 to 150) of transitory elk that utilize the planning area. Use occurs primarily at the lower elevations. There is no key elk habitat area within the project boundary; no calving is known to occur within the planning area. Hiding cover has been affected in the lower elevations by past thinning projects in the ponderosa pine stands, but the project does provide similar connectivity for elk that it does for deer. Connectivity/hiding cover exists in the lower elevations in the form of mixed pine stands (ponderosa/lodgepole pine).

In general, the planning area contains both summer and winter habitat, and elk are generally associated with the planning area during both seasons. Although stands in each plant association do provide both cover and forage to some extent, hiding cover primarily exists in the mixed pine stands with the forage component primarily within the pure ponderosa pine stands. Open road densities are high in the lower elevations and disturbance from motorized vehicles are equally high due to both automobiles and off highway vehicles.

All Alternatives

The following table analyzes the effects to deer and elk habitat as a result of the proposed alternatives. Standards and Guidelines for elk habitat are the same as for deer habitat, except in the case of Key Elk Habitat. There is no designated key elk habitat area within the planning area.

Table 3-27. Deer and Elk (Big Game) Habitat Components.

Habitat Component	Management Plan	Management Plan Standard	Alternative 1 No Action	Alternative 2	Alternative 3
Hiding Cover 1) Hiding Areas or 2) Hiding Areas plus 600 feet from hiding areas)	LRMP WL-54 WL-56	30% or 70% w/600 ft.	54%	34%	34%
Forage		Not Specified	46%	66%	66%
Open Road Density planning area	LRMP WL-53	2.5 mi/sq.mi	3.5 mi/sq.mi	3.1 mi/sq.mi	3.1 mi/sq.mi

As a result of the No Action alternative, big game habitat will remain at the current levels for the short –term. There will continue to be disturbance and harassment from motor vehicles (cars, trucks, and OHVs). In the long-term, as stand densities increase in the early and mid-seral structural stands, shrub biomass (i.e. forage) will decrease. As stated earlier, transition range is important for males coming out of the rut; reduced forage will likely result in reduced health of individual males as they come out of the rutting season and prepare to enter the winter season. Stands currently functioning as hiding cover may have considerably reduced growth rates or have increased risk of mortality due to insects, disease, and/or wildfire.

There are approximately 3.5 miles/square mile of open roads within the planning area. The Deschutes LRMP threshold for summer and transition range is 2.5 miles/square mile In addition to the designated national forest system roads, there are many miles of undesignated, non-system roads and trails. These roads and trails are not managed. Deer are susceptible to disturbance in the late fall and early winter after the rut. During this time period they are

trying to reserve energy and regain some fat that was depleted during the rut. Open roads and trails allow motorized access to hunters and this disturbance adds to the loss of fat reserves/energy from the rut. The effects of the use of the current road density, in addition to the non-system/ undesignated roads and trails, are reducing the current effectiveness of the habitat and may have effects to individual deer or elk health.

Alternative 2 and 3:

Vegetative treatments under Alternatives 2 and 3 would reduce hiding cover thus affecting deer movement and security, but would promote the growth of forage through thinning and natural fuels treatments. Although cover will be reduced, the overall cover levels still meet forest plan standard and guidelines. Alternative 2 proposes treatment in approximately 6,618 acres of hiding cover and Alternative 3 proposes 6,500 acres of treatment within existing cover stands.

Cover is not necessarily evenly distributed within the planning area. The best hiding cover is in the eastern portion at higher elevations. The western portion of the planning area is primarily associated with black bark ponderosa pine at lower elevations. These stands have received past treatments and do not provide good cover. This has been accounted for in the analysis of hiding cover percentages. Treatments proposed in these lower elevation areas will thin black bark ponderosa pine and reduce lodgepole pine encroachment in these stands. Thinning would open up stands further increasing sight distances (i.e. reduce hiding cover). Mitigation measures are proposed to retain 10% of these treatment areas. The treatments to the black bark will allow bitterbrush to better regenerate due to a more open canopy. This will provide a better forage base in the transition range, allowing the deer to be better prepared when they get to their wintering ground. Although treatments are proposed in a little over a third (37%) of the existing hiding cover, the eastern portion of the planning area will continue to provide the better cover.

Proposed fuel treatments associated with mowing and prescribed fire will reduce the quantity of shrubs in the short-term, but in the long-term will increase and maintain young vigorous shrubs for forage. Fuels treatments along the urban interface on the western boundary of the project will be more intense than areas away from the interface, and forage as well as cover will be impacted. However, the habitat effectiveness of these areas adjacent to major roads and urban interface are already low due to human interactions (homes, vehicles) and domestic animal interaction (e.g. dogs).

Proposed road closures will help increase the effectiveness of the habitat by reducing a vector of disturbance that deplete fat/energy reserves.

As a result of the proposed treatments, hiding cover and forage, especially within the urban interface, will be reduced in the short-term. This may impact the health of individuals in the short-term, but as forage increases due to the opening of the canopy in the black-bark stands, and other stands respond to thinning treatments with tree growth, habitat effectiveness will likely increase and have reduced risk of loss due to fire, insects, or disease.

Within the landscape adjacent to the Lava Cast planning area, the adjacent planning areas affect deer habitat with proposed or ongoing treatments. The planning areas contain both summer and winter range and impacts to these habitat types have been determined within each planning area. Lava Cast is identified as summer range and is used as transition range as deer migrate from summer to winter range. A cover analysis was completed for Lava Cast and Fuzzy planning areas. These planning areas are associated with the North Paulina Deer Herd Unit designated by the Oregon Department of Fish and Wildlife, of which the Lava Cast project area is a part. The following table summarizes hiding cover within the planning areas associated with the North Paulina Deer Herd Unit.

Table 3-28: Hiding cover within the North Paulina Deer Herd Unit

Cover Type		Deschutes LRMP Target	Kelsey	Fuzzy	Lava Cast
Hiding Cover	Summer range	30%	40%	39-44%	54% No Action 34% Alt. 2 34% Alt. 3

Within each planning area, proposed treatments have or would reduce hiding cover, however cover levels would not be and have not been reduced below forest plan standards and guidelines for any planning area.

The majority of treatment that has been proposed in these planning areas has been thinning of mid/early seral vegetation to promote health and vigor. These planning areas contain large expanses of densely stocked stands primarily “black bark” ponderosa pine. These are 80 year old stands that are generally so dense that bitterbrush production within these areas are limited or shrubs are decadent due to shading, which limits forage or palatable forage on the landscape. Peek et al (2000) has shown in a 35 year period, that shrub biomass declines as overstory biomass increases. Due to increase in urbanization throughout central Oregon deer habitat has become increasingly fragmented. Forage production is crucial on public lands, providing deer an opportunity to build up some energy reserve prior to entering winter range. With an increase in urbanization as well as cumulative impact of projects such as Tract C land conveyance, the Lava Land Visitor Center access project, widening of Highway 97, and Sunriver interchange, will collectively continue to fragment deer habitat and make migration even more difficult. It is essential to optimize forage production and habitat for deer in the long-term due to the fragmentation of habitat and the decline of migration routes to winter range.

Disturbance as a result of open road densities is also an issue within the larger landscape. Densities on the landscape in most cases exceed our forest plan standard of 2.5 miles per square mile. With the increase of urbanization, the number of motorized vehicles that utilize these open roads has increased along with an increase in the amount of user created off highway vehicle trails. Stress levels for deer increase along with habitat fragmentation due to the amount of open roads, which makes it more difficult for deer to reserve energy prior to enter winter range. This is additive to the reduced hiding cover as a result of the action alternatives. The Fuzzy planning areas have reduced open road densities moving toward our forest plan objective of 2.5 miles per square mile. Under the action alternatives for this

project, there would be a cumulative benefit of closing and decommissioning roads because reducing the disturbance and harassment as a result of the open road density will off-set some of the effects of reduced hiding cover (see Roads Analysis section p. 131). Under the no action alternative, there would continue to be a high open road density and OHV use whose adverse affects to big game are additive to potential effects of retaining dense, high risk stands. Overall, within the North Paulina Herd Unit there has been an overall net decrease in open road densities due to past planning area decisions.

Overall, Alternatives 2 and 3 will provide the most productive as well as viable long-term big game habitat. Cover objectives meet forest plan standards and road densities are being moved towards forest plan objectives. Although the exact impacts to deer populations are difficult to measure, treatments would enhance long-term habitat. Measures will be taken to minimize short-term impacts from vegetation treatments (e.g. retention patches and road closures and decommissioning).

GOSHAWK
Existing Condition

In Oregon, goshawks tend to select mature or old-growth stands of conifers for nesting, typically those having a multi-layered canopy with vegetation extending from a few meters above ground to more than 40 meters high. Generally nesting sites are chosen that are near a source of water and are on moderate slope, usually having northerly aspects. This habitat type is quite similar to that used by the Cooper's hawk, but the trees tend to be older and taller and have a better-developed understory of coniferous vegetation (Reynolds, Meslow, and Wight, 1982 in Csuti et al, 2001). Foraging generally occurs within these mature stands where small openings occur. These birds generally forage on passerines (e.g. songbirds), but often utilize small mammals such as rodents as well as the occasional snowshoe hare. Other bird species are also preyed upon such as blue and ruffed grouse. Species and abundance of gallinaceous prey varies in the range of the goshawk depending on elevation and latitude.

The planning area was surveyed every field season from 2001 to 2004. One goshawk was observed within the proximity of a historic territory in 2002, 2003, and 2004, however no nest was located. There are two historic nest sites associated with the planning area. As directed by the Eastside Screens, two 30 acre nest cores were designated for both historical nest sites as well as two 400 acre post fledging areas (PFA). These nest cores were surveyed in 2006 with no response or presence of goshawks noted. An analysis of habitat was completed prior to the 2001 surveys using GIS. Approximately 10,101 acres were identified and ground-verified as primary goshawk nesting and foraging habitat within the entire planning area. Due to the amount of past harvest treatments, as well as disease and infestation, the habitat identified is very fragmented and discontinuous. A map displaying suitable goshawk habitat was generated and surveys were implemented using this map. Natureserve Explorer (2006) reports from various sources of information that a goshawk territory would encompass 3 sq. miles or 1,920 acres of forest to 6,000 acres of forested stands in various seral stages. Using these territory sizes and the amount of goshawk habitat in the planning area, there would likely be habitat for 2-5 pairs of goshawks.

The two designated PFAs are largely made up of later structural stages, but do contain some early to mid structure. There is a non-system road that enters PFA 3040. There is a system road open through PFA 3037. Open roads within a post-fledging area reduce the effectiveness of the habitat.

Alternative 1 - No Action

Without treatments in the planning area, habitat, as it exists, will remain unchanged in the short-term. In the long-term stands that currently provide habitat will diminish due to loss of habitat from beetle and mistletoe infestation, and from overstocking. Without treatment to early- and mid-seral stands, stands will continue to grow and some habitat will develop, but the distribution of that habitat will diminish and suitable habitat will only exist in very small isolated pockets that may or may not support breeding pairs and fledglings. The dry mixed conifer and lodgepole pine stands found in the more eastern parts of the planning area would likely provide the best habitat under these circumstances.

There would likely be continued trend in reduced habitat quality due to roads going through goshawk post-fledging areas.

Alternative 2 and 3:

Vegetation Treatments

There are approximately 3,332 acres of goshawk habitat proposed to be treated under Alternative 2 and 2,915 acres under Alternative 3. There are no proposed units within any known nest core area. Treatments associated with these alternatives consist of commercial thinning and combinations of precommercial thinning and/or fuels treatments. These treatments will reduce stand densities, which will assist in reducing the amount of fuel loading within stands. Treatment units vary from stands of dense lodgepole pine of various ages, stands of mature and mid seral ponderosa pine and mixed conifer containing a multi-layered canopy, to stands containing a mixture of both mature overstory ponderosa pine with a dense understory of lodgepole pine. Generally stands of lodgepole pine are not preferred nesting habitat, but are known to be used as such on the district; it generally provides areas of foraging habitat.

Approximately 48 acres of thinning are associated with one designated post fledging area (PFA 3037). This is not the historic territory in which recent sightings of an adult have been made. There is approximately 32 acres of thinning associated with PFA 3040. Recent sightings were near this PFA. Both units within these PFA's are not within the nest core, and the units treat portions of the PFA in the early-mid structural stages. In the short term, treatments associated with the PFA (3037) and other thinning associated with identified goshawk habitat, would still provide nesting, because nest core will not be treated, and foraging habitat. Continuous canopy will still exist but will have some small openings. The understory will primarily be open with some clumps of early seral regeneration which would provide habitat for different goshawk prey species.

Approximately 7,186 - 6,769 (67-71%) acres of goshawk habitat will remain untreated under both alternatives (Alternative 3 retains the most goshawk habitat). In the long term, the treatments would provide goshawk nesting habitat that is more resilient to insects and disease, as well as wildfire. Proposed treatments within goshawk habitat in general retain their value as foraging habitat, but preclude its use as potential nesting habitat until tree crowns close together. In units proposed for more widely-spaced thinning (809-827 acres; Alternatives 3 and 2, respectively), the development of nesting habitat may take more years than thinning that leaves a higher basal area and more trees.

Alternative 3 thins fewer acres and retains more LOS stands that can contribute towards goshawk habitat than Alternative 2. The negative impacts from proposed commercial harvest in goshawk habitat are fewer under Alternative 3 than the Proposed Action. Alternative 2 may provide habitat for up to 3 pairs of goshawks. Alternative 3 may provide habitat for up to 4 pairs of goshawks.

An open, system road runs through goshawk territory 3037, and associated with proposed Unit 182, a non-system road runs through goshawk territory 3040. These roads directly reduce the habitat within the PFAs (i.e. road beds do not provide goshawk habitat), and contribute a vector of disturbance within a territory. This potentially affects reproductive success. Closure of these roads would help mitigate the short-term effects of treatments proposed, and enhance the habitat within PFA 3037 and 3040. In the long-term, closing these roads would provide for higher quality habitat within these territories. A mitigation measure is proposed to obliterate the non-system road within PFA 3040. The road through 3037 was analyzed for closure but deemed necessary for other resource concerns (e.g. fire suppression, silviculture). Other proposed road closures, overall, benefit goshawk habitat in the planning area by reducing disturbance even if the closure is not directly tied to a designated PFA.

Fuels Treatments

Fuels treatments associated with goshawk habitat are primarily underburning and mowing. However, in the lodgepole pine and some mixed conifer stands mechanical and handpiling and pile burning will be prescribed. These treatments could affect foraging habitat by removing habitat utilized by goshawk prey species. This effect may be off-set by the fuels treatments creating a higher diversity of available cover and forage for prey species by creating a mosaic of vigorous shrubs and grasses.

The effects of the proposed treatments, together with foreseeable treatments within and adjacent to the planning area, is a short-term, downward trend in the overall amount of dense high risk stands currently used for nesting by the northern goshawk in this area; but an upward trend in the amount of open stand conditions more suitable as foraging habitat (approximately 36,000 acres within the Lava Cast and Fuzzy combined or 27% of the total of these planning areas). There will be an additional 18 acres of habitat eliminated and 4.5 miles of road added of the combined areas due to Highway 97 widening and interchange development and rerouting access, 67 acres impacted from mistletoe treatment and thinning around Lava Lands Visitor Center and Lava River Cave. Any known nest sites within the planning area of each of these raptor species are protected from disturbance with nest core areas designated and deferred from treatment; this would also be the case in the Fuzzy planning area.

Through time, nesting habitat will develop and be at lower risk to wildfire and beetle-induced mortality and of higher quality because of increased diameter growth due to thinning treatments within the planning areas. With current management objectives to develop more LOS habitat (often the best potential nesting habitat), treatments will assist in creating more stable habitat in the future. The results are likely more stable populations of these species throughout the landscape.

Treatments associated with Alternatives 2 and 3 would have beneficial long-term impacts by creating stands that are more resilient to insects, disease and wildfire. Alternative 3 retains the most habitat in short-term (outside of the no action alternative). Treatments will impact approximately 29-33% of the identified goshawk habitat within the planning area; maintaining foraging habitat value, but losing some nesting habitat potential due to decreased canopy closure. It is estimated that until the stands respond to treatment and crowns/canopies close, treatments could potentially reduce the number of pairs of goshawks in the planning area by 1.

COOPER'S HAWK/ SHARP-SHINNED HAWK
Existing Condition

Cooper's Hawk

The Cooper's hawk prefers coniferous, mixed and deciduous forests, as well as riparian, juniper, and oak woodlands. Cooper's hawks commonly nest in deformed trees infected with mistletoe. (Marshall et al. 2003). Structure stages 4 and 5 (Understory Reinitiation and Multi-stratum without large trees) potentially provide the best habitat within the planning area (22,290 ac). A Cooper's hawk territory can be 200-1700 ac in size; with ranking in Oregon being "apparently secure" (Natureserve, 2006). This information would suggest that the planning area may have up to 13 pairs of Cooper's hawks when using the larger territory size. Pairs of Cooper's hawks in eastern Oregon have been found at a density of one for every 4,589 acres (Henny, 2003). Considering only the forested habitat within the Lava Cast planning area, there could be upwards of 5 pairs of Cooper's hawks in the planning area based on this territory size.

There are no known active Coopers' hawk nests within the planning area, however much of the lower elevation 60 to 80 year old "black bark" ponderosa pine provides nesting and foraging habitat within the planning area. Coopers' hawks have commonly been observed using these stand types on the district, and during surveys for goshawks, Cooper's hawks have been detected in each of the plant associations within the planning area.

Sharp-Shinned Hawk

In Oregon the sharp-shinned hawk breeds in a variety of forest types that have a wide range of tree species, though most are dominated by conifers. Nests have been located at elevations that range from roughly 300 to 6000 feet. Vegetative characteristics found at nest sites, include high tree density and high canopy cover, which produce cool, shady conditions. Nest stands preferred by sharp-shinned hawks are younger than those preferred by Coopers' and goshawk,

usually 25-50 yr old, even-aged stands. In eastern Oregon all nest sites found by Reynolds et al. (1982) were in even-aged stand of white fir, Douglas-fir, ponderosa pine, or aspen, with ground vegetation limited to grasses and creeping barberry (Marshall et al. 2003). Natureserve (2006) reports a separation distance of 10 km for sharp-shinned hawk conservation. Assuming a 10 km circle, this would roughly equate to a 78 acre territory. However, when considering other literature sources, White-Scheuering and McAtee (2003) reported one sharp-shinned hawk nest for every 6,793 acres in southern Oregon. Considering only the forested habitat within the Lava Cast planning area, there could be upwards of 3-4 pairs of sharp-shinned hawks in the planning area based on these territory sizes. Natureserve also reports that the sharp-shinned hawk has a ranking of "apparently secure" in Oregon. Structure stages 3 and 4 (Stem Exclusion and Understory Reinitiation) potentially provide the best habitat within the planning (20,204 ac).

There are no known active sharp-shinned hawk nest sites associated with the planning area, however much of the lower elevation early/mid-seral lodgepole pine and white fir (mixed conifer) stands at the mid to high elevation provide higher quality nesting and foraging habitat within the planning area than the ponderosa pine.

Alternative 1 - No Action

Currently the majority of the potential habitat for these species is within the early-mid seral stands of ponderosa pine (11,376 acres or 56% of sharp-shinned habitat in ponderosa pine type and 15,059 acres or 67% of Cooper's hawk habitat in ponderosa pine type). These stands tend to be overstocked and are at risk of beetle infestation as well as stand replacing fire. Without treatment, in the short-term these stands will continue to provide habitat, however in the long-term they will begin to deteriorate and new habitat development will decrease. Stands are more prone to wildfire and beetle infestation. Habitat potential would decline and population levels would likely become more unstable.

Alternatives 2 and 3:

Because proposed treatments target the early to mid seral stages used by these species, impacts from the alternatives are similar. Under Alternative 2, the proposed treatments would degrade, in the short-term, approximately 6,582 acres of potential Cooper's hawk and approximately 6,328 acres of sharp-shinned hawk habitat by reducing the crown density, tree density, and canopy closure. Under Alternative 3, proposed actions would degrade, in the short-term, approximately 6, 495 acres and 6,328 acres of Cooper's hawk and sharp-shinned hawk habitat, respectively. For both species and under both alternatives these acres reflect nearly 30% of the total potential habitat available. Approximately 62% of the affected sharp-shinned habitat and 79% of the affected Cooper's hawk habitat is within the ponderosa pine plant association group.

Effects to the habitat of these species caused by the action alternatives are similar to those discussed for the northern goshawk. In the short-term, habitat would be reduced as stands are thinned and tree canopies become more open. In the long term, more suitable habitat would develop that will tend to be more stable. Because most of the treatments focus on mid-seral

ponderosa pine stands in the lower elevation, the best habitat for these species, in the short-term, is more likely to be found in the higher elevation stands in the eastern part of the planning area. Approximately 2,774 acres of mixed conifer and lodgepole pine mid-seral habitat will be treated. This equates to nearly 75% of the current potential habitat in these plant associations would not be treated (11,091 total acres of sharp-shinned and Cooper's hawk habitat combined within the lodgepole pine and mixed conifer types). In the long-term, while there will be suitable nesting habitat for these species in the mid- to late-seral stands, the most effective habitat may be found in the areas that are currently in the earlier seral stages and not currently proposed for treatment. In the future these stands will be more dense stands that benefit these species for nesting.

Due to proposed treatments and the objective to restore the historic range of variability of ponderosa pine-dominated habitat, there will likely not be as much potential habitat for these species within the planning area as there is currently. Using the estimates for home range sizes reported in Natureserve (2006), the proposed alternatives could potentially displace 30% of the Cooper's and sharp-shinned hawks. Using the densities found in other literature (Henny, 2003 and White-Scheuering and McAtee, 2003), the proposed alternatives would potentially affect 1 Cooper's hawk territory and one sharp-shinned hawk territory.

Road closures within proposed units currently functioning as potential habitat will mitigate disturbance effects that may be occurring in Cooper's hawks and sharp-shinned hawk habitat.

The effects of the proposed treatments, and foreseeable treatments within and adjacent to the planning area, is a short-term, downward trend in the overall amount of dense high risk stands currently used for nesting by the northern goshawk, Cooper's hawk, sharp-shinned hawk, but an upward trend in the amount of more open stand conditions more suitable as foraging habitat. Within the next 20-30 years it is anticipated that the structural stages used by these species will continue to dominate the landscape. As treatments promote LOS development, there will still be Cooper's hawk and sharp-shinned hawk habitat but it would not likely dominate the landscape, as it does currently. There will be an additional 18 acres of habitat eliminated and 4.5 miles of road added of the combined areas due to Highway 97 widening and interchange development and rerouting access, 67 added acres impacted from mistletoe treatment and thinning around Lava Lands Visitor Center and Lava River Cave. Any known nest sites of each of these raptor species within the planning area are protected from disturbance with nest core areas designated and deferred from treatment; this would also be the case in the Fuzzy planning area.

Overall, through time, nesting habitat will develop and be at lower risk to wildfire and beetle-induced mortality and of higher quality due to thinning. With current management objectives to develop more LOS habitat, treatments will assist in creating more stable habitat in the future but at a lesser amount than is currently available. This may result in more stable populations of these species throughout the landscape, and less risk of displacement due to large, stand replacing events.

Similar to the discussion for goshawks, there will be long-term benefits as a result of the proposed treatments, because habitat would become more stable. Alternative 3 results in

stands with dense patches and uneven gaps, that results in more potential habitat. Effects to Cooper's and sharp-shinned hawk populations are likely to result in a stable trend in populations.

RED-TAILED HAWK
Existing Condition

This species has an extremely wide tolerance for a variety of habitat conditions. Red-tails are largely perch hunters. Habitat types that provide suitable perches (trees, utility poles, outcrops, etc.) and are open enough to permit the detection of ground-dwelling prey, typically support red-tailed hawks. Red-tails frequent woodland, agricultural land, clearcuts, grasslands, sagebrush plains, alpine environments, and urban areas. They construct nests in a variety of situations including trees, utility poles, cliffs, and place their nests higher than other broad-winged hawks (Marshal et al. 2003). The planning area provides abundant foraging habitat, due to its amount of fragmentation (e.g. lava flows, plantations, and power and gas lines). Most of the plantation units have residual overstory trees associated with the units that could provide potential roost and nest sites. Red-tails are commonly observed soaring in the planning area and are common across the district. There are no known nest sites that occur within the planning area. Natureserve (2006) ranks this species as "secure" in most of continental United States, including Oregon.

Alternative 1 – No Action

In the short-term individual old-growth trees that provide nest trees will diminish due to individual mortality. In the long-term stands will be slow to mature due to over stocking, and nest trees will be incidental due to the lack of LOS that will develop. Suitable nest trees may become more sporadic on the landscape.

Alternatives 2 and 3

Under Alternatives 2 and 3 the project would not affect or remove any nesting habitat (i.e. trees >21"dbh). As a result of removal of the under-story as proposed in the LOS ponderosa pine units, action alternatives would increase higher quality foraging habitat in the short-term by opening stands up for hunting. Treatments in ponderosa pine LOS stands would not measurably affect red-tail habitat. Treatments to mid-seral stands would promote and accelerate the development of LOS. Residual large structure (trees >21"dbh) in these mid-seral stands would act as nest trees and perches. The thinning and fuels treatment would open stands, creating better foraging habitat as well as promote a better forage base for prey species. Thinning, in the long-term, would accelerate the development of more large trees used for nesting.

Due to the minimal direct/indirect effects to red-tailed hawk habitat, any cumulative effects are difficult to accurately measure and are not relevant as to making a decision between the alternatives.

OSPREY

Existing Condition

This species historically nested only in forested regions of Oregon because of its selection of large live trees (broken top) or dead trees (snags) for nest sites. Nests in Oregon are usually located within 2 miles of water with an accessible fish population. Nest sites on utility poles are common due to land clearing for agriculture and lack of suitable habitat for nesting. They will also use nest platforms developed for Canada Geese as nest sites, which was noted to occur at wildlife refuges (Marshall et al. 2003).

There are no designated Osprey Management Areas associated with the project. During field reconnaissance an osprey nest was located on a sparsely vegetated lava flow adjacent to the planning area. The nest tree is a large diameter ponderosa pine that is positioned out in the open environment of the lava field. Foraging habitat occurs outside and to the west of the planning area, and is associated with the Little Deschutes and main stem of the Deschutes River (> 1.5 miles from the closest unit). Natureserve (2006) reports that osprey numbers are increasing and gives the osprey an "apparently secure" ranking in Oregon.

Alternative 1 – No Action

The planning area is on the fringe of what osprey could potentially use as habitat due to the distance to foraging habitat. Most of the planning area is more than 2 miles from the rivers. There are no short-term impacts to osprey as a result of this alternative. In the long-term, there could potentially be limited available nest trees as a result of lack of treatment to promote future old growth habitat.

Alternatives 2 and 3:

There are no treatment units associated with the osprey nest. Treatments associated with ponderosa pine habitat types in the planning area will benefit osprey in the long-term. These actions will remove ladder fuels from existing LOS stands reducing the risk of crown fire within these stands. Thinning within the black-bark stands will promote growth and accelerate the development of future LOS, by reducing stand densities, minimizing risk of beetle infestation and stand replacing fire.

Treatments associated with the Lava Cast project are beneficial to the long-term production of nesting habitat, by maintaining and developing future LOS.

AMERICAN MARTEN

Existing Condition

There are no known historic sightings within the planning area. American martens occupy a narrow range of habitat types, living in or near coniferous forest (Allen 1987). More specifically, they associate closely with late-successional stands of mesic (moist or wet)

conifers, especially those with complex physical structure near the ground (Buskirk and Powell 1994). The information synopsis in Natureserve (2006) states that fallen logs and debris are special habitat features, and that an average territory size is approximately 10 sq. km (4 sq. mi or 2,560 acres). Complex physical structure addresses important life needs. It provides protection from predators, access to the subnivean (below snow) space where most prey are captured in winter, and provides protective thermal microenvironments (Buskirk and Powell 1994). Desirable forest types for the marten are large, somewhat dense, stands of lodgepole pine, mixed conifer, and mountain hemlock. Abundant coarse woody material in these stands is important to support a rodent prey base (LRMP WL-61). Natureserve (2006) ranks this species as being "vulnerable" in Oregon.

Much of the monitoring for marten that has been completed on the Forest has occurred on the Sisters and Crescent Ranger Districts (personal communication M. Gregg, wildlife biologist). Identified occurrences on the Deschutes National Forest, in the above listed habitat types, have generally been above 4,500 feet in elevation. The planning area consists of approximately 21% lodgepole pine and approximately 20% mixed conifer (roughly 13,000 acres combined) that is predominantly at or above 4,500 ft elevation. Within the planning area, the majority of habitat exists within the mid and late seral stands of mixed conifer and lodgepole pine PAG's in the eastern portion of the planning area in the higher elevations. About 23% (2954 ac) of all the lodgepole and mixed conifer associations in the planning area exists within the later, mature stages (691 acres or 5% of LOS). These areas provide viable foraging and denning habitat for up to two marten territories or up to approximate population density of up to 6 individuals. The mixed conifer and lodgepole pine habitat types have a good distribution of mature stands. Through field reconnaissance and stand exam data, it is estimated that much of the early seral stands have low amounts of CWM (habitat for prey).

Alternative 1 – No Action

Overall, stocking levels within the mid-late stands are high and in the short-term will provide habitat. However, in the long-term stands are at risk of bark beetle infestation, resulting in diminished over-head canopy cover. Risk of stand replacing fire will increase. In the long-term, LOS development will be slowed due to stocking levels in the early and mid structural stage stands which would then reduce the likelihood of marten use and/or the availability of quality marten habitat.

Alternatives 2 and 3:

Treatments are proposed within lodgepole and mixed conifer habitats, although these units are within the mapped range of historic ponderosa pine dominance, with a majority of these treatments within the mid-seral/structural staged stands. Treatment objectives are to restore historic ponderosa pine habitat. This will reduce the amount of marten habitat within the planning area. Commercial thinning focusing on reducing dwarf mistletoe infestation (dwarf mistletoe is known to be used by martens for denning), and commercial thinning that targets lodgepole pine and white fir for removal in the mature seral stands would degrade marten habitat. These treatments may hinder the development of marten habitat. White fir, especially, provides the near-ground structure marten utilize for hunting and for cover. Alternative 2

proposes 307 acres of these treatments and Alternative 3 proposes 333 acres of these treatments (10% and 11% of the current marten habitat in the area, respectively). Lodgepole pine and mixed conifer LOS provide the most suitable habitat that is currently available. Alternative 2 alone proposes to commercially treat LOS (205 acres). Treatments in the mid-structural stage stands within the lodgepole and mixed conifer types would reduce the amount of future marten habitat. Alternative 3 proposes an additional 117 acres of these types of treatments in mid-seral lodgepole pine/mixed conifer associations.

Treatments do not remove any trees greater than 21 inches from these stands where they exist and white fir greater than 16 inch not located within the crown of a ponderosa pine will be retained. These mitigation measures help off-set some negative effects to marten habitat. Post treatment, a continuous over-story would provide future structure for the forest floor, with stands containing approximately 40 to 90 trees per acre. White fir in these stand are short-lived and provide easy cavity excavation for primary cavity nesters as well as secondary cavity users such as the marten. These stands are highly productive and within 10 -15 years post-treatment it is projected that they will contain a complex understory of lodgepole pine and white fir regeneration. There are many stands interspersed between treatment units with mid seral mixed conifer and lodgepole pine that will not be treated and provide connectivity for foraging and dispersal habitat through the planning area.

Marten will utilize CWM for hunting/travel and denning (if large enough). Removal of CWM will indirectly affect martens by removing some potential denning habitat (if large logs are removed) and access to subnivean zones while hunting. This will render the remaining habitat as less effective than if logs were not removed. For both alternatives, the proposed action to grapple-pile larger CWM is proposed for 25 acres within current marten habitat; 141 acres in the total lodgepole pine/mixed conifer associations. Approximately 116 of these total acres are proposed within units identified as being historic ponderosa pine which, historically, would not have been considered marten habitat. Grapple-piling/removing CWM, in conjunction with the commercial thinning prescriptions especially within the mixed conifer/lodgepole pine associations, would effectively preclude the development of marten habitat.

As a result of the action alternatives, available marten habitat would be decreased. Alternative 3 impacts more current marten habitat than Alternative 2 because it converts more mixed conifer and lodgepole habitat to ponderosa pine. Taking into account all treatments within current mixed conifer and lodgepole pine habitat whose objective is to restore ponderosa pine dominance, Alternative 2 will impact 25% of the current marten habitat, and Alternative 3 would impact 26%. All of the potential marten habitat that may be impacted by the action alternatives is in the mid-seral stages. The higher quality habitat, lodgepole/mixed conifer LOS, will not be affected. This decrease in potential habitat is a long-term effect, and although does not encompass a whole marten territory, could reduce the population levels within the planning area.

Retaining the existing condition of potential habitat within the Lava Cast planning areas may provide more habitat for marten populations in the short-term. In the long–term, retaining a high level of risk to these stands may ultimately decrease marten habitat on the landscape as a result from a large wildfire. Cumulatively, maintaining potential habitat that has a high risk of

beetle-induced mortality and/or wildfire also increases the risk of losing the habitat quickly. This can contribute towards a decreasing trend in marten populations

The action alternatives would, in the long-term, contribute to more stable marten habitat on the landscape. However, overall potential marten habitat would decrease because of treatment objectives to favor ponderosa pine over white fir or lodgepole pine. The total acres of lodgepole and mixed conifer plant associations not treated are 13,000 acres or 41% of the planning area.

Also reducing the risk to this potential habitat, as a result of commercial treatments, may contribute to more resiliency of the habitat to catastrophic wildfire. Alternative 3 of the Lava Cast project treats the most acres, however also incorporates actions that will help minimizes the short-term negative impacts (e.g. retention of >16" dbh white fir). Alternative 3 may provide a better distribution of usable marten habitat in the short-term due to variable density thinning. Overall, there would likely be a decrease followed by a stable trend in marten populations as a result of the action alternatives.

The McKay Firewood Cutting Area (3,300 ac) overlaps the Lava Cast planning area; with approximately 2,475 acres of the firewood area being potential marten habitat (lodgepole and mixed conifer PAGs). Firewood cutting removes some attributes of marten habitat because it allows the removal of standing dead and downed lodgepole pine. Proposed units that overlap this firewood cutting area cumulatively degrade potential marten habitat (226 acres). Of the current marten habitat, 165 acres (5% of current habitat) falls into this overlap of proposed units and firewood area.

In total, considering past, ongoing, and foreseeable projects, there will be approximately 18% of current marten habitat degraded over the landscape and 7% of the lodgepole and mixed conifer habitat types (potential marten habitat) degraded as a result of the action alternatives.

Converting and restoring the historic range of variability of ponderosa pine LOS within the Lava Cast planning area would reduce the amount of marten habitat. However, a majority of the current and future habitat is not treated in this proposal, which would maintain marten habitat. Although Alternative 3 proposes more actions within current marten habitat, it incorporates a variable thinning approach and retains all lodgepole and mixed conifer LOS. Post treatment stands would still contain a continuous multi-storied canopy that is more resilient to insect, disease and wildfire. Some habitat for marten still exist in stands, due to the retention of the larger trees (>16"dbh) and maintenance of CWM levels of at least the directed levels. Habitat connectivity occurs throughout the habitat type due to residual untreated stands.

SPECIES OF CONCERN (SOC)

BATS

Existing Condition

Small-footed myotis
Roosting, nursing, and hibernating habitat occurs on the Deschutes National Forest (NF). While primarily associated with cliffs and rock canyons in arid grassland and desert scrub, this species is also found in ponderosa pine and mixed conifer forest. It finds night roost and day retreats in rock crevices, under boulders or, sometimes, beneath bark, and hibernates in caves and mines. This species forages over rocks rather than water. It flies along cliffs and rocky slopes at heights of 1 to 3 meters (Csuti et al. 1997). Natureserve (2006) ranks this species as vulnerable in Oregon.

Long-eared myotis
Occurrence of this species is documented on the Deschutes NF. This species is associated primarily with forested habitats and forested edges, including juniper woodland, open areas in ponderosa pine woodlands, Douglas-fir, spruce, true fir, and subalpine forests, as well as willow and alder forests along streams. It also occurs in arid shrublands if suitable roosting sites are available. The long-eared myotis emerges late in the evening, and feeds by picking prey items off the surface foliage. Although most probably migrate out of state during the coldest part of the year, a few have been found in caves in Oregon during winter (Csuti et al. 1997). Natureserve (2006) ranks this species as apparently secure in Oregon.

Long-legged myotis
This species of bat has been documented as occurring on the Deschutes NF, and is most closely associated with forested habitat, most notably old growth stands. Day and night roost habitat mainly consists of large diameter snags and rock crevices (Ormsbee 1995). Perlmeter 1998 and 1999) showed that this species on the Bend Ft. Rock selected large ponderosa pine snags >21 inches dbh for day roosts. Foraging occurs in mature open stands and early seral stage stands (Erickson and West 1995). Trees and large snags provide the most important habitat for nursery colonies (Barbour and Davis 1969). These bats have been documented to hibernate in caves on the Deschutes NF. Natureserve (2006) ranks this species as vulnerable in Oregon.

Western big-eared bat
Occurrence of this species is documented on the Deschutes NF. This species of bat depends on caves for hibernation, for raising their young, and for day and night roosting. They forage in a broad range of forested conditions, from open savanna to fully stocked conifer stands. Prey species are strongly associated with bitterbrush, ceanothus, and other shrub species (Miller 1995). Most foraging is suspected to occur within five miles of their day roosts. Past studies have shown that foraging along forest edges occurred most often, apparently related to availability of prey species (moths) and protective habitat for predation (Clark 1993). They depend on open water to meet moisture requirements.

Large winter hibernating populations of these bats occur in a few caves on the Bend-Ft. Rock Ranger District. The population is estimated to be 600 individuals in central Oregon (including the Deschutes National Forest and immediately adjacent areas). There are an estimated 2,500 in Oregon. Population trends for central Oregon, based on winter counts in hibernacula, have indicated a decline of about 25% since 1986. The decline is probably related

to disturbance of hibernating bats, disturbance to the maternity roosts, and effects of recent wildfires. Natureserve (2006) ranks this species as imperiled in Oregon.

Habitat for these bats is limited within the Lava Cast planning area. There are no lava tubes within the project area. Large snags >21" dbh do occur but are limited within the planning area due to harvest that took place in the 1930's. There are large lava fields in the planning area that could provide potential roost sites, with bat usage likely to be incidental. The project is within 5 miles of other lava tubes and provides an abundance of foraging habitat associated with forest edges.

Fringed Myotis

The fringed myotis has similar habitat requirements to those of the western big-eared bat (i.e. use of caves, mines, abandoned buildings). Natureserve (2006) ranks this species as imperiled in Oregon. Potential effects to fringed myotis are similar to those discussed for the western big-eared bat.

Alternative 1 - No Action

Habitat condition would remain unchanged as a result of the no action alternative in the short-term. In the long-term, without treatments LOS habitat would be slow to develop and potential for roost trees would be limited due to a disjunctive distribution of old growth. In a worst case scenario, the increased risk of wildfire could result in long-term habitat loss, specifically of roost trees.

Alternative 2 – Proposed Action

Most of these bat species are associated, at least partially, with mature ponderosa pine forests, and utilize large snags as day roosts (exception are the big-eared bat and fingered myotis). The alternative does not propose the removal of any large trees that are > 21" dbh. No large snags that are potential roost sites will be removed unless there is a safety issue (i.e. hazard tree adjacent to a roadside); this potential loss can be mitigated by limiting treatments near these snags. This alternative proposes to treat 355 acres of current ponderosa pine LOS. The majority of the actions proposed under this alternative will be in early to mid structural ponderosa pine (6,893 acres), however the primary objective for treatments are to restore the historic range of variability of ponderosa pine LOS. Treatments would benefit bats in the long-term by promoting LOS habitat that will provide foraging and future snags for day roosts. Short-term impacts from prescribed burning and mowing vegetation would reduce habitat that is utilized by prey species such as moths (6,122 acres or 19% of the planning area with mowing and/or underburning treatment that potentially impacts shrub/prey habitat).

Alternative 3

Effects as a result of this alternative are similar to those described for Alternative 2, with the exception that no ponderosa pine LOS will be commercially treated. Fuels and small-tree thinning is still proposed. No commercial harvest of LOS may reduce the chance that a large

snag is felled for safety reasons, and maintains more trees that may become snags sooner than in Alternative 2.

Approximately 27% of the planning area is proposed to receive or has recently received mowing or burning treatments (8% from previously planned Fuels and timber stand improvement activities within the planning area). There will be cumulative short-term impacts to foraging/prey habitat as a result of prescribed fuels and mowing treatments. In the long-term, prey species will benefit from over-story biomass reduction in the early to mid seral stands allowing for more shrub biomass production in the understory. This will provide for a healthier more vigorous habitat for prey base. Restoration and maintenance of historic ponderosa pine LOS will improve the current lack of roosting structure in the planning area, but may temporarily decrease the prey availability for bat species that forage over shrubs (western big-eared bat). Based on earlier habitat descriptions, it appears that most of the bat species discussed forage or hunt within a variety of habitats ranging from rocky areas to tree foliage.

Cumulative effects addressed previously for landscape level impacts to LOS habitat and snag habitat apply to bat habitat. Overall, treatments proposed on the landscape will promote long-term habitat for these species. Projects such as the Tract C Land Conveyance, Sunriver Inter-change, and Highway 97 widening will remove over 900 acres of potential bat habitat adjacent to the planning area and their effects to bats will be additive to the short-term effects resulting from the action alternatives. Effects of the alternatives are expected to be short-term with long-term benefits, however, and any cumulative effects of these alternatives with other projects are also expected to be short-term.

Impacts to existing snag levels are minimized (see snag discussion). Thinning and fuels treatment would provide stands that are more resilient to catastrophic fire and provide long-term habitat, although in the short-term there may be incidental impacts to prey species habitat (shrubs). Mitigation measures to retain snags and incorporate no-treatment patches will help mitigate short-term effects. Effects in the long-term are beneficial to the production of habitat for these species.

LANDBIRDS

Existing Condition/ Key Habitat Types

Ponderosa Pine (white-headed woodpecker, pygmy nuthatch, chipping sparrow)
Older, single story ponderosa pine forests have incurred one of the most widespread and strongest declines among habitat types in analysis of source habitats for terrestrial vertebrates in the Interior Columbia Basin (Wisdom et al. in press). Within the Northern Cascades, Southern Cascades, and Upper Klamath Ecological Reporting Units of the Interior Columbia Basin Assessment, old forest, single over-story ponderosa pine habitat has declined by 97, 55, and 18% respectively (Wisdom et al. in press). The result of degradation of ponderosa pine forest from fire suppression and extensive timber harvest has been the change of large areas of late-seral ponderosa pine forest to mid-seral stands of Douglas fir and grand/white fir. According to Altman (2000), due to the extensive loss of ponderosa pine forest, habitat

restoration is the most important strategy for conservation of landbirds associated with this habitat type. The desired condition in ponderosa pine forest is a large tree, single layered canopy with an open, park-like under-story dominated by herbaceous cover with scattered shrub cover and pine regeneration. Ponderosa pine forest within the East-Slope Cascades Landbird Conservation planning unit occurs extensively at low elevations in all the subprovinces except the Columbia Foothills where it is a minor component.

Landbird conservation in ponderosa pine forests emphasizes maintaining healthy ecosystems through representative focal species for four habitat conditions. These include large patches of old forest with large snags, large trees, and an open under-story with regenerating pines, and patches of burned old forest (see Table 3-29 for the focal species for whom these habitat conditions address). Potential impacts to two of the focal species for this habitat, the white-headed woodpecker and pygmy nuthatch, were also addressed in the snag discussion earlier in the document. There are no patches of burned old forest within the Lava Cast planning area that would be suitable for Lewis' woodpeckers; therefore this habitat feature and focal species are not discussed.

Conservation strategies for management of these habitats and intended to provide habitat for the focal species include: use of prescribed burning and/or thinning when and where appropriate to reduce fuel loads and accelerate development of late-seral conditions; retain all large trees, especially ponderosa pine >20" dbh; initiate snag creation and recruitment where necessary; retain all existing snags and broken-topped trees in units; implement road closures (obliteration); and minimize invasion of exotic and noxious weeds and soil erosion.

Unique Habitats – Old growth Lodgepole pine (black-backed woodpecker)

Landbird conservation is also directed toward several unique habitats in the East-Slope Cascades. In lodgepole the conservation emphasis is the presence of old growth trees. Both wet and dry meadows are also emphasized. Under this heading, old-growth (LOS) lodgepole pine is the only unique habitat found within the Lava Cast planning area. Potential impacts to the focal species for this habitat, the black-backed woodpecker, were also addressed in the snag discussion earlier in the document.

Conservation strategies for old-growth lodgepole pine habitat and intended to provide habitat for the focal species include leaving portions unsalvaged in burned and beetle-killed areas; and exempting areas from commercial timber management in order to retain LOS characteristics as long as possible (Altman, 2000).

Mixed Conifer (Late-Successional) – (brown creeper, Williamson's sapsucker, flammulated owl, olive-sided flycatcher)

The justification for Mixed Conifer as a priority habitat is a substantial loss of the late-successional stage of this habitat type. It has commonly been treated with regeneration prescriptions such as clearcuts or shelterwood cuts to reduce insect and disease and reduce the risk of catastrophic fire. The desired condition in Mixed Conifer (Late-Successional) forest is

a multi-layered old forest with a diversity of structural elements (e.g., snags, dense shrub patches, and high canopy closure) in patches across the landscape.

Birds species associated with Mixed Conifer (Late-Successional) forest have been adversely impacted primarily by the loss and reduction of late-seral conditions and structural elements such as large snags and trees (see Table 3-29). Landbird conservation in late-successional mixed conifer forest emphasizes maintaining healthy ecosystems through representative focal species of five habitat conditions. These include large trees, large snags, interspersion of grassy opening with dense thickets, a multi-layered/dense canopy stand, and edges and openings created by fire. Potential impacts to the focal species for this habitat, the Williamson's sapsucker and flammulated owl (cavity-nesting birds), were addressed in the snag discussion earlier in the document. The habitat feature for flammulated owls within this strategy, that is interspersion of grassy openings with dense thickets, is not currently found in the planning area.

Conservation strategies for management of these habitats and intended to provide habitat for the focal species are similar to those described for ponderosa pine including: use of prescribed burning and/or thinning when and where appropriate to reduce fuel loads and accelerate development of late-seral conditions; retain all large trees; initiate snag creation and recruitment where necessary; retain all existing snags and broken-topped trees in units; implement road closures (obliteration); and minimize invasion of exotic and noxious weeds and soil erosion.

Table 3-29: Priority habitat features and associated focal species for conservation in Ponderosa Pine and Lodgepole Pine and Mixed Conifer habitats of the East-Slope Cascades Landbird Conservation Planning Region.

Habitat	Habitat Feature/Conservation Focus	Focal Species by Subprovince
		Central Oregon/Klamath Basin
Ponderosa Pine	large patches of old forest with large snags	white-headed woodpecker
	large trees	pygmy nuthatch
	open under-story with regeneration pines	chipping sparrow
	patches of old burned forest	Lewis' woodpecker
Lodgepole Pine	old growth	black-backed woodpecker
Mixed Conifer	Large trees	Brown creeper
	Large snags	Williamson's sapsucker
	Interspersion grassy openings and dense thickets	Flammulated owl
	Multi-layered dense canopy	Hermit thrush
	Edges and openings created by wildfire	Olive-sided flycatcher

The habitat feature and conservation focus listed above is associated with LOS ponderosa pine, mixed conifer and lodgepole pine. Mixed conifer designated in the planning area is different than that defined in the Landbird Strategy, in that the planning area is comprised of white fir, ponderosa pine, and lodgepole pine. Within the Landbird Strategy the mixed conifer is

comprised of Douglas-fir and white fir as well as species of pine. Stands with LOS characteristics are limited in the planning area. Approximately 4% of the ponderosa pine stands have been classified as LOS or have LOS characteristics, 3% of lodgepole pine, and 8% mixed conifer stands are classified as LOS.

Alternative 1 – No Action

Under the no action alternative, stands of early to mid seral habitat in the above habitat PAG's will remain at high densities which may favor the habitat features for hermit thrushes in mixed conifer and chipping sparrows in ponderosa pine. However, the conservation strategies for the different habitat types would not be addressed and the habitat features for the white-headed woodpecker, pygmy nuthatch, brown creeper, black-backed woodpecker, and Williamson's sapsucker (i.e. large trees and snags in ponderosa pine and mixed conifer and old-growth lodgepole pine) will remain as uncommon features in the planning area and at risk to mortality due the competition of dense, smaller trees (in the case f large trees) or to an uncharacteristic wildfire due to fuel loadings (especially snags). Stands will continue to mature, but due to the current high densities, would remain at increasing risk of a landscape scale stand replacing fire or high levels of bark beetle attacks or both. Large areas of future LOS more than likely won't develop and LOS would remain in small patch-like patterns for the long-term. The small areas of existing LOS will not receive treatments to reduce the risk of fires within the stands. Ladder fuels would continue to build and risk of crown fires in the stands will increase. Future habitat would either be lost or not develop for the above listed species that were identified as having habitat within the project area. The habitat feature for flammulated owls, interspersions of grassy openings and dense thickets, may develop in the event of wildfire occurring in the area, as would habitat for the olive-sided flycatcher.

This alternative would have no additive effects to the habitat features and focal species within the planning area. It would also not address the conservation strategies or actions that would improve habitat for the focal species. In the long-term, this may have negative effects on landbirds.

Alternative 2 – Proposed Action

Approximately 558 acres of LOS are treated under this alternative. Most of the activities support the conservation strategies for these habitat types; however the proposal to grapple pile larger coarse woody material in efforts to reduce fuel loading within 73 acres of mixed conifer LOS would not support the conservation strategies to develop late-seral conditions. Although this particular aspect would not affect the particular habitat features of the focal species within mixed conifer associations. Commercial prescriptions call for thinning at varying densities, 404 acres of pre-commercial thinning, and 473 acres of fuels treatments (mowing and/or burning, and the piling mentioned earlier). These treatments reduce the risk of stand replacing wildfire, but would reduce habitat availability for focal species such as the chipping sparrow and hermit thrush that use a multi-layer or younger age stand. The treatments may provide for more habitat with similar characteristics as those for flammulated owls. Overall, treatments prescribed in LOS only make up approximately 2% of the planning area. The majority of treatments prescribed in the planning area are within the early and mid seral stands.

Approximately 8,976 acres of early and mid habitat is scheduled for commercial and non-commercial thinning which is approximately 28% of the planning area. All trees >21" dbh are to be retained, and white fir >16" dbh are retained. Stand densities would be reduced, thus reducing the risk of disease and infestation to the stand as well as accelerating tree growth that produce LOS in the long-term. Treatments proposed could disturb nesting landbirds during the spring and early summer from activities such as thinning, prescribed burning, and mowing. In the long-term, species such as white-headed woodpecker, pygmy nuthatch and olive-sided flycatcher would benefit from the LOS stands that would develop following treatment. Landbird species associated with older ponderosa pine benefit from the proposed actions because their objective is to restore the historic range of variability of this habitat type which was historically dominated by ponderosa pine. This objective, as obtained through proposed actions under this alternative, may not benefit the other focal species (lodgepole pine and mixed conifer) because it is applied to 203 acres of current lodgepole LOS and mixed conifer-dense multi-story canopy habitat.

Within the planning area and the adjacent and nearby planning areas (Fuzzy, East Tumbull), improving the stability and quality of ponderosa pine habitat, and developing more late-seral ponderosa pine habitat provides better habitat distribution of the focal species. It is estimated that through these management objectives to improve the resiliency of the stand and increase tree growth (i.e. development of LOS) there would be an approximate 25% increase in this type of habitat (7% from the proposed actions in Lava Cast). Increased amounts of quality habitat in the planning area provide more resiliency of the focal species' habitat, and possibly, their populations in the event of a large wildfire or insect outbreak.

As a result of Alternative 2 there would be an 11% decrease in old growth lodgepole pine habitat over the combined adjacent planning areas. The Lava Cast planning area provides habitat for species such as black backed, three-toed, and hairy woodpecker, which are associated with mature lodgepole pine habitat. In the adjacent and nearby planning areas of East Tumbull and Fuzzy are predominantly comprised of ponderosa pine habitats, and treatment to mature lodgepole pine habitat is minimal. Within the Lava Cast planning area, approximately 38 acres of old growth lodgepole pine will be thinned under Alternative 2 (approximately 19% of the LOS lodgepole pine within the planning area). This will reduce the effectiveness of the habitat in the short-term, the removal of dead lodgepole pine snags as a result of the McKay firewood cutting area would be additive because the focal species, black-backed woodpeckers, utilizes lodgepole pine snags. On a landscape level, however, commercial treatments would have little to no effect since there is habitat that would not have any treatment.

Alternative 2 results in a decrease of 165 acres of mixed conifer LOS that most closely provides the multi-layered canopy habitat feature and habitat for the hermit thrush (the focal species). The other planning areas do not contain LOS in this plant association (e.g. Fuzzy and East Tumbull) or very little. Over the combined planning areas this amounts to an approximate 30% decrease in mixed conifer LOS. The proposed actions however, will create the habitat features associated with the other focal species as previously discussed.

Cumulative effects from the Timber Stand Improvement CE (TSI) add treatments that address more of the conservation strategies, especially in the ponderosa pine habitat. Although the Lava Cast proposal does not include any snags creation, the TSI project includes girdling of trees that will quickly become snags; augmenting the existing snags levels.

For landbirds, this will mean short-term effects due to the treatments within LOS habitats, but with long-term benefits of increased habitat availability due to healthier stand conditions.

Alternative 3

Alternative 3 is more conducive to land birds as a result of the variable density thinning and the retention/non-commercial treatment of a majority of current LOS stands. A patchy mosaic with up to two acre openings are produced as a result of treatment in the ponderosa pine and mixed conifer stands. This treatment type leaves denser patches of trees and canopy for foraging and nesting. Under Alternative 2 treatments produce a more homogenous approach of evenly spaced trees and therefore reduce the effectiveness of habitat. Alternative 3 also produces better ground nesting habitat due to the patch distribution of trees and the shrubs associated with openings. Fuels treatment will be similar to those described for Alternative 2, with the exception that no grapple piling of larger woody debris would occur in LOS. The variable thinning would likely maintain habitat for species such as the hermit thrush and chipping sparrow that use multi-storied stands and younger trees, while also creating small openings (<2 acres) that may provide some more suitable habitat for flammulated owls. In the long-term, more habitat will likely be created for white-headed woodpeckers, brown creepers, Williamson's sapsuckers, and pygmy nuthatches as stands respond to thinning and trees grow larger.

Overall, Alternative 3 will best meet the intent of the conservation strategies for each of the habitat features/conservation focus. By addressing the conservation strategies for the habitat, habitat for the focal species would continue to be available in the short-term, and likely improve in the long-term.

Within the planning area and the adjacent and nearby planning areas (Fuzzy, East Tumbull), improving the stability and quality of ponderosa pine habitat, and developing more late-seral ponderosa pine habitat will provide better habitat distribution of the focal species. It is estimated that through these management objectives to improve the resiliency of the stand and increase tree growth (i.e. development of LOS) there would be an approximate 25% increase in this type of habitat (7% from the proposed actions in Lava Cast). Increased amounts of quality habitat in the planning area will provide more resiliency of the focal species' habitat, and possibly, populations in the event of a large wildfire or insect outbreak.

As a result of Alternative 3 there would be no loss of lodgepole LOS habitat and treatments to younger lodgepole or around the existing LOS may protect this habitat for black-backed woodpeckers. However, as discussed in the snag section, an objective to move the area towards the HRV for ponderosa pine and improve the health of stands may, in the long-term, restrict older lodgepole pine to areas where it is the dominant plant association as opposed to areas where it is currently competing with ponderosa pine.

Cumulative effects from the Timber Stand Improvement CE (TSI) will add treatments that address more of the conservation strategies, especially in the ponderosa pine habitat. Although the Lava Cast proposal does not include any snags creation, the TSI project includes girdling of trees that will quickly become snags; augmenting the existing snags levels.

For landbirds, this will mean short-term effects due to the treatments within LOS habitats, but with long-term benefits of increased habitat availability.

Spring/summer logging and fuels treatment activities in the spring and summer may disturb local nesting populations of NTMBs, but are not expected to compromise population viability at the landscape level. Mitigation measures help assures that impacts are minimal. Alternative 3 maintains the most suitable habitat distribution for landbirds due the variable density thinning, while enhancing stands to provide sustainable LOS in the long-term.

No intentional take of migratory birds is expected to occur as result of the project.

ROADS ANALYSIS

The LRMP threshold for road density in deer summer range (this includes transition range) is 2.5 mi/sq. mile. The current open road density is 3.5 miles/sq. mile.

Alternative 1 - No Action

The effects of the No Action alternative in regards to road density are the effects of the current open road density. With the current density above the LRMP threshold level, this indicates that disturbance and harassment resulting from this density may be unacceptable. However, selection of this alternative would not address the disturbance and harassment effects.

Alternatives2 & 3

A roads analysis process was completed for the Lava Cast planning area. Roads with high effects to wildlife were identified. A high effect was defined as having either 1) a change in direction of migration increasing the potential for mortality for animals migrating or dispersing due to road interactions or increased exposure to predation. The road segment may also have high secondary effects by facilitating human use in the area; or 2) affecting one or more critical habitats within the watershed to a point where species use may be limited due to road influence at a level that may impact local populations; or 3) road segment is contributing to fragmentation directly by impacting large amounts of core habitat and/or subsequently facilitating traffic to secondary roads and human associated activities within core habitats. Roads in this category exist in already highly fragmented habitats or provide primary access into an otherwise unfragmented area; or 4) road segment is contributing to potential reduction of snag and downed log densities and is located in a watershed where past activities have resulted in currently lower densities. Road segments that are on relatively mild slopes in areas where off road travel is permitted present the greatest risk for snags and downed log reductions extended distances from the road. These identified roads were then sent through a series of

"filters" with a result of differing scales of road closures. Roads selected for closure to mitigate the effects of treatment were those with high effects to wildlife and determined to be unnecessary to remain open or superfluous for fire suppression, fuels maintenance, silvicultural maintenance (e.g. plantations), or range improvements activities. This roads analysis focuses on current, open system roads. Temporary roads will have impacts similar to current open system roads. Their effect, however, will be temporary because they will be closed upon completion of harvest activities.

Proposed vegetation treatments would reduce hiding cover. This is defined as vegetation that hides an individual (mainly defined for big game), from disturbance and harassment (including motorized vehicles). Therefore closing these roads will help mitigate the effect of reduced hiding cover by limiting the amount of motorized vehicle disturbance and harassment. For the purposes of this analysis, proposed road closures make no distinction between closing the road (blocking and disguising the entrance; 11-18 miles) and decommissioning (permanently removing road from system; 1.1 miles).

Similarly, there are proposed treatments and roads within connectivity corridors. Although the proposed treatments within the corridors still allow the corridor to function after treatment, they do decrease the effectiveness of the corridor by opening up the canopy. Roads through corridors can also affect the suitability of the corridors for small ground-dwelling wildlife (e.g. small rodents, reptiles), and to a lesser degree larger wildlife and forest birds. The road bed acts as an area of open space that an individual must cross (exposure) and also as a vector for predators or competing wildlife (e.g. cowbirds, coyotes) and disturbance (motorized vehicles). Closing the road limits the disturbance and allows the slow, natural process of vegetation to grow back. In the long-term, the proposed treatments and the road closures act together in improving the effectiveness of the corridors.

The following table illustrates the resulting open road density. It also illustrates that although the threshold density will not be attained, proposed road closures would enhance conformance with the standard and guideline and provide a net benefit.

Table 3-30: Additive open road density (miles/square mile).

Closure Category	Resulting Open Road Density
LRMP Threshold	1.0-2.5
Existing (No Action)	3.5
Mitigation	3.1

No action (i.e. no road closures) would maintain the current situation. As surrounding communities continue to grow it is foreseeable that interest in the area for a variety of recreational uses would lead to an increase in road use resulting in even more disturbance that potentially affects habitat effectiveness and individual wildlife health. Many of the current uses by wildlife (summer and transition range for big game, breeding habitat for other species) are also during the times of highest use of the roads. The action alternatives begin to address these issues by closing some roads and reducing, at different scales within the alternatives, disturbance and harassment. This reduces the additive disturbance caused by the proposed vegetation treatments.

The following table compares the open road densities as a result of proposed actions in adjacent and nearby planning areas to those in the Lava Cast planning area.

Table 3-30: Comparison of open road densities (miles/square mile)

Planning Area	Proposed Open Road Density	LRMP Threshold
Lava Cast (Summer Range)	3.1	2.5
Kelsey (Summer Range)	2.7	2.5
Fuzzy (Winter Range)	1.5	1.0-2.5
East Tumbull (Winter Range)	1.3	1.0-2.5

Open road densities are above the LRMP threshold levels. Proposed mitigation closures will bring the open road density closer to LRMP standards.

SOILS

The long-term sustainability of forest ecosystems depends on the productivity and hydrologic functioning of soils. Ground-disturbing management activities directly affect soil properties, which may adversely change the natural capability of soils and their potential responses to use and management. A detrimental soil condition often occurs where heavy equipment or logs displace surface organic layers or reduce soil porosity through compaction. Detrimental disturbances reduce the soils ability to supply nutrients, moisture, and air that support soil microorganisms and the growth of vegetation. The biological productivity of soils relates to the amount of surface organic matter and coarse woody debris retained or removed from affected sites.

Forest soils are considered a non-renewable resource, as measured by human life spans, and maintenance or enhancement of soil productivity is an integral part of National Forest management. Therefore, an evaluation of the potential effects on soil productivity is essential for integrated management of forest resources.

Scope of the Analysis

The soil resource may be directly, indirectly, and cumulatively affected within each of the activity areas proposed within the project area. An activity area is defined as "the total area of ground impacted activity, and is a feasible unit for sampling and evaluating" (FSM 2520 and Forest Plan, page 4-71). For this project proposal, activity area boundaries are considered to be the smallest identified area where the potential effects of different management practices would occur. Thus, the discussion of soil effects and soil quality standards will be focused on the units proposed for silvicultural and fuel reduction treatments. The activity areas range in size from approximately 2 acres to 333 acres.

Quantitative analyses and professional judgment were used to evaluate the issue measures by comparing existing conditions to the anticipated conditions which would result from implementing the proposed actions. The temporal scope of the analysis is defined as short-term effects being changes to soil properties that would generally revert to pre-existing

conditions within 5 years or less, and long-term effects as those that would substantially remain for 5 years or longer. This analysis also considered the effectiveness and probable success in project design and implementation of the management requirements, mitigation measures, and Best Management Practices (BMPs) which are designed to avoid, minimize or reduce potentially adverse impacts to soil productivity.

Affected Environment and Existing Conditions

The Lava Cast project area covers approximately 36,050 acres within the Newberry Volcano physiographic area, where essentially all landforms, rocks, and soil are products from volcanic events that occurred over various time periods. Approximately 81 percent of the planning area is comprised of gently sloping plains and uneven lava flows that lie below and surround cinder cones and buttes that account for about 10 percent of the total acreage. Miscellaneous landtypes (i.e., outwash plains, terraces, depressions and flats) comprise the remaining 9 percent of the area. Dominant landforms have average slope gradients that range from 0 to 30 percent. Steeper slopes (30 to 70 percent) are associated with cinder cones, escarpments of buttes and ridges, the edges of lava flows, and dissections of outwash plains. Elevation ranges from about 4,200 feet along the western boundary to approximately 6,000 feet in the southeastern corner of the project area. Mean annual precipitation varies across the landscape due to changes in elevation, but it generally ranges from about 15 to 25 inches.

The project area includes portions of the Sugar Pine Butte and Kawak Butte West sub-watersheds. Most of the water yielded from these lands is delivered to streams as deep seepage and subsurface flows that emerge at lower elevations. The nearest perennial stream is the Little Deschutes River, approximately one-quarter mile west of the project area boundary. There are no known perennial or intermittent streams within the project area. Ephemeral stream channels may exist, but no obvious channels were located during field reconnaissance in the fall of 2003 (Walker, 2004). There is no surface connection to perennial streams. Soils derived from volcanic ash deposits have high infiltration and percolation rates that account for low amounts of overland flow. Surface runoff generally occurs only in areas with shallow soils and disturbed sites during high intensity storms or when the ground is frozen. There is low potential for sediment yield because any channeled surface flows would likely be discontinuous and of short duration. There are no known riparian areas or riparian-dependent resources within the project area. Therefore, there would be no effects to any Oregon Department of Environmental Quality 303(d) listed water bodies or essential fish habitat (Walker, 2004).

The project area contains 37 landtype units based on similarities in landforms, geology, and climatic conditions that influence defined patterns of soil and vegetation (Soil Resource Inventory, Larsen, 1976). The biophysical characteristics of these landtype units can be interpreted to identify hazards, suitability, and productivity potentials for natural resource planning and management.

With the exception of the youngest lava flows, the majority of the planning area (approximately 90 percent) has been covered by a moderately thick layer of volcanic ash and pumice from the Mount Mazama and Newberry Crater volcanic eruptions. These deposits consist mostly of sand-sized soil particles. Dominant soils are moderately deep (20 to 40

inches) to deep (greater than 40 inches) with loamy-sand textures and moderate productivity potential for the growth of vegetation. These soil types tend to be non-cohesive (loose) and they have very little structural development due to the young geologic age of the volcanic parent materials. Soils derived from volcanic ash have naturally low bulk densities and low compaction potential. However, mechanical disturbances can reduce soil porosity to levels that limit vegetative growth, especially where there is a lack of woody debris and surface organic matter to help cushion the weight distribution of equipment. Due to the absence of rock fragments on the surface and within soil profiles, these ash-influenced soils are well suited for tillage treatments (subsoiling) that loosen compacted soil layers and improve the soils ability to supply nutrients, moisture, and air that support vegetative growth and biotic habitat for soil organisms. The sandy surface layers are easily displaced by equipment operations, especially during dry moisture conditions. The maneuvering of equipment is most likely to cause soil displacement damage on the steeper landforms. Dominant soils within the planning area are not susceptible to soil puddling damage due to their lack of plasticity and cohesion.

On undisturbed sites with gentle slopes, surface erosion occurs at naturally low rates because soils are protected by vegetation and organic litter layers. At the present time, soils within the project area are adequately protected to control erosion rates within tolerable limits. Surface erosion by water is generally not a concern because dominant landtypes have gentle slopes and low-to-moderate erosion hazard ratings. Accelerated surface erosion is usually associated with disturbances that reduce vegetative cover, displace organic surface layers, or reduce soil porosity through compaction. Soils derived from volcanic ash are easily eroded where water becomes channeled on disturbed sites such as road surfaces, trails, skid trails, and log landings.

Dominant landtypes within the Lava Cast planning area generally have moderate productivity ratings. All activity areas proposed for commercial timber harvest and non-commercial thinning treatments meet the criteria for land suitability that would allow them to be regenerated or resist irreversible resource damage. The locations of the proposed activity areas exclude areas with little or no natural soil such as barren lava flows, non-vegetated cinder cones, or other sparsely vegetated sites with scattered non-commercial trees.

Sensitive Soil Types

Based on criteria for identifying sensitive soils to management (Deschutes LRMP (Appendix 14, Objective 5), sensitive soils within the Lava Cast project area include the following categories:

1) **Soils on slopes greater than 30 percent (slopes range from 25 to 80 percent).**
   - Cinder Cones – Forested: Map Unit 81 (982 acres on south aspects), Map Unit 82 (510 acres on north aspects), Map Unit 83 (215 acres at high-elevation).
   - Cinder Cones – Barren: Map Unit 9 (33 acres).
   - Escarpments/Side Slopes – Forested: Map Unit 14 (1,268 acres on edges of lava flows), Map Unit 84 (17 acres on steep side slopes of volcanoes).
2) **Soils with a high hazard rating for surface erosion.**
   - Map Unit 84 (17 acres on steep side slopes of shield or composite volcanoes).

3) **Potentially wet soils with seasonal or year-long high water tables.**
   - Map Unit 5 (2 acres of wet meadow).
4) **Soils associated with frost pockets in cold air drainages and basins.**
   - Map Units 15 and 6G (59 acres of ponderosa pine basins and 29 acres of lodgepole pine in depressions of lava plains.
   - Map Units 70, 73 and 6B (514 acres on plains with ponderosa pine and 835 acres on plains with mixed ponderosa pine and lodgepole pine.
5) **Soils that occur in localized areas of rocky lava flows.**
   - Map Unit 1 (3,903 acres of barren lava flows), Map Unit 11 (163 acres of low density timber) and Map Unit 76 (911 acres of ponderosa pine, site index 50 to 80).

Approximately 26% (9,441 acres) of the project area contains landtypes with localized areas of sensitive soils. It should be emphasized that only portions of these total landtype acres actually contain sensitive soils. Areas with sensitive soils are typically confined to specific segments of the dominant landform and they are generally too small to delineate on maps. Sensitive soil areas that occur within proposed activity areas are discussed under the effects of implementing the action alternatives (p. 154).

Detrimental Soil Disturbance

Natural Events

There is currently no evidence of detrimental soil conditions from natural disturbance events within the Lava Cast project area. Enough time has passed since the occurrence of past wildfires that there is currently no evidence of severely burned soils and/or accelerated surface erosion within affected areas. The recovery of native vegetation and forest litter are currently providing adequate sources of ground cover to protect mineral soil from water and wind erosion. There are no natural or management-related landslides known to exist within the planning area. Dominant land types do not meet criteria for landslide prone terrain and the coarse textured soils have high permeability that precludes the buildup of hydraulic pressures that could trigger landslides. Therefore, natural soil disturbances were not included as existing sources of detrimental soil conditions within any of the activity areas proposed for this project.

Management-Related Disturbances

Timber Management

Ground-based railroad logging was used to harvest large-diameter ponderosa pine in portions of the project area during the 1920's and 1930's. Most soil impacts likely occurred on and adjacent to heavy-use areas, such as roads, railroad grades, main skid trails, where surface soils were displaced and multiple equipment passes caused soil compaction. Recovery rates are mainly dependent upon the number of stand entries, soil moisture conditions during harvest, soil texture, and rock fragment content. Since volcanic ash-influenced soils have naturally low bulk densities and compaction potential, it is expected that natural processes have gradually restored soil quality over the past 70 to 80 years. Walk through surveys were conducted on a few of these sites, and visual evidence of old logging facilities is very difficult to observe due to the abundance of ground cover vegetation and forest litter. Soils on previously compacted sites have likely returned to near-natural density levels through frost heaving, freeze-thaw and

wetting-drying cycles. The establishment of native vegetation and accumulation of fine organic matter have been improving areas of past soil displacement.

Based on more recent harvest history, various silvicultural treatments were implemented between 1966 and 2002. Previous silvicultural prescriptions included approximately 652 acres of commercial thinning, 2,267 acres of intermediate (partial removal), and 483 acres of regeneration harvest. Ground-based logging equipment disturbed soils on portions of 67 of the 164 EA units proposed for mechanical harvest under Alternative 2, and 66 of the 161 EA units proposed under Alternative 3. There was no overlap of previously harvested areas within the remaining EA units proposed under either of the action alternatives. Additional soil impacts occurred on portions of the McKay woodcutting area (approximately 3,300 acres). The primary sources of detrimental soil conditions are associated with the transportation system and existing logging facilities which were used for timber harvest and yarding activities. Temporary roads, log landings, and primary skid trails were constructed and used to access individual harvest units of past timber sales. Most project-related impacts to soils occurred on and adjacent to these heavy-use areas where mechanical disturbances removed vegetative cover, displaced organic surface layers, or compacted soil surface layers. Research studies and local soil monitoring have shown that soil compaction and soil displacement account for the majority of detrimental soil conditions resulting from ground-based logging operations (Page-Dumroese, 1993; Geist, 1989; Powers, 1999; Deschutes Soil Monitoring Reports).

Soil condition assessments were conducted for a representative sample of past harvest treatments that included commercial thinning, intermediate (partial removal) and regeneration harvest prescriptions. Detrimental soil compaction on main skid trails was the primary disturbance category observed where equipment operations were intensive. Shovel probing was used to assess compaction using resistance to penetration as a measure. Soil displacement, as defined by FSM 2521.03, was more difficult to distinguish due to the establishment of native vegetation and the accumulation of forest litter. Observations suggested that equipment turns or movement generally caused more mixing of soil and organic matter than actual removal from a site. Based on the proportionate extent of overlap of sampled areas with the proposed activity areas, these field assessment results are included in the percentages of existing detrimental soil conditions displayed in Appendix D (p. 201).

The extent of detrimentally disturbed soil is dependent on a number of variables including the types of silvicultural prescriptions, the intensity of equipment use with each entry, and the spacing distances between main skid trails. Soil monitoring results on local landtypes and similar soils have shown that 15 to 30 percent of the unit area can be detrimentally disturbed by ground-based harvest systems depending on harvest prescriptions and soil conditions at the time of harvest.

Since multiple entries have been made in some past harvest areas and most soil disturbances occurred prior to LRMP direction (1990), conservative estimates were used to predict how much surface area is currently impacted by existing roads and logging facilities for the remaining activity areas which were not measured in the field. A combination of harvest history data, research references, personal communications with timber sale administrators, and field assessments of similar soils and harvest treatments was used to estimate how much surface area is currently impacted within each of the activity areas proposed for this entry.

The majority of past treatments were intermediate partial removal and regeneration harvest prescriptions that typically cause more soil disturbance than thinning prescriptions because equipment use is more intensive throughout activity areas (Soils Report, page 9). Activity areas which were previously managed with intermediate harvest prescriptions generally have about 23 percent detrimental soil conditions associated with existing skid trails and log landings. Past regeneration treatments (e.g., clear cuts, shelterwood, overstory removal, etc.) generally cause about 6 percent more detrimental soil conditions (29 percent) and commercial thinning treatments cause about 6 percent less soil impacts (17 percent) than disturbed-area estimates based solely on skid trail spacing distances and the average size of log landings. Based on the proportionate extent of overlap of past treatments with the proposed activity areas, these percentages were used to calculate existing amounts of detrimental soil conditions associated with existing logging facilities for each of the activity areas planned for this project.

Much of the random disturbance between main skid trails and away from landings has decreased naturally over time. Research has shown that the detrimental effects of soil compaction generally require more than 3 to 5 equipment passes over the same piece of ground (McNabb, Froehlich, 1983). Where logs were skidded with only 1 or 2 equipment passes, soil compaction was shallow (2 to 4 inches) and the bulk density increases did not qualify as a detrimental soil condition. Frost heaving and freeze-thaw cycles have gradually restored soil porosity in areas with slight to moderately compacted layers near the ground surface. Other factors that have helped the recovery process include root penetration, rodent activity, wetting and drying cycles, and surface organic matter. The establishment of vegetative ground cover and the accumulation of litter and organic matter has also been improving areas of past soil displacement. There is no evidence that post-harvest, broadcast burn treatments caused any severely burned soil in random locations off designated logging facilities in previously managed areas.

It is estimated that approximately 3,800 acres within the McKay woodcutting area (6,300 acres) were non-commercially harvested in the past. Based on field experience of the district firewood coordinator, it is estimated that woodcutter roads have impacted about 10 percent of the soil in previously undisturbed portions of the McKay woodcutting area (DeMello, personal communication). In fuelwood cutting areas with previous commercial harvest, soil condition assessments have shown that the combined effects of these activities caused detrimental soil conditions on approximately 30 percent of the unit area. These disturbed area estimates were used to calculate the existing percentage of detrimental soil conditions associated with existing skid trails, log landings and woodcutter roads within portions of 36 activity areas proposed under both action alternatives.

Subsoiling treatments have rehabilitated approximately 212 acres of detrimentally compacted soil associated with temporary roads and logging facilities in portions of 27 past harvest areas within the planning area. Approximately 12 soil restoration (subsoiling) acres overlap portions of four proposed activity areas (EA Units 115, 191, 193, and 251) which are now scheduled for re-entry with this project. These soil restoration acres were deducted in the calculated estimates of existing detrimental soil conditions because subsoiled areas are expected to reach full recovery through natural processes within the short-term. Soils committed to logging facilities and woodcutting roads in other portions of the project area will remain in a

detrimental condition until restoration activities are implemented to improve the hydrologic function and productivity on disturbed sites with compacted soils.

Based on the best available information regarding past harvest, firewood cutting and soil restoration activities, the overall extent of soil impacts associated with existing logging facilities is estimated to be approximately 746 acres under Alternative 2, and 721 acres under Alternative 3. It was concluded that 44 of the proposed activity areas (Alternative 2) and 42 activity areas (Alternative 3) currently have detrimental soil conditions that exceed 20 percent of the unit area. Existing detrimental soil conditions for these activity areas range from 21 to 31 percent with an average of 27 percent. The remaining EA units (120 units in Alternative 2 and 119 units in Alternative 3) have existing detrimental soil conditions that range from 0 to 20 percent and average 5 percent.

Roads

Roads detrimentally disturb soil properties and convert the soil resource to a non-productive condition. There are approximately 195 miles of classified system roads that have removed an estimated 298 acres of soil from a productive status. Segments of existing roads, ranging from less than 0.1 to 1.2 miles (0.2 to 1.9 acres), that cross through portions of 135 activity areas (Alternative 2) and 134 activity areas (Alternative 3) are included in the estimated amounts of existing detrimental soil conditions in Table 3-32 (p. 152) and the quantitative, unit specific information in Appendix D. Road surveys would be conducted to identify where improvements may be necessary to correct drainage problems on existing system roads that would be used as haul routes for this project.

Recreation Activities

Developed recreation facilities preclude other uses of the soil for as long as they remain in use. The planning area contains two developed system trails and trailheads; the Hoffman Island trail (about 0.7 miles) and the Lava Cast Forest trail (about 0.9 miles). These recreation facilities are excluded from the proposed activity areas and do not increase the estimated percentages of existing detrimental soil conditions for any of the activity areas displayed in Appendix D.

Soil impacts from dispersed recreation activities are usually found along existing roads, trails and other management facilities where vegetation has been cleared and soils have been previously disturbed by other land uses. Approximately 25 dispersed campsites, that average about 1/8 acre (0.125) in size, occur in scattered locations throughout the project area. Due to the average size of the EA units, the minor extent of detrimental soil conditions from dispersed recreation use is not expected to have a measurable effect on site productivity within any of the individual activity areas proposed for this project. Conservative estimates were used to account for soil disturbances from existing roads and logging facilities, and the extent of these impacts likely included in these estimates.

Detrimental soil disturbances from user-created OHV trails occur in scattered locations of the project area. An inventory of OHV disturbances was conducted within the planning area, and the data indicates that a total of approximately 234 miles (59 acres) of user-created trails currently exist off existing roads and previously disturbed sites. Disturbed tread widths ranged from 2 feet to 6 feet depending on the type of machine and the intensity of use. This equates to approximately 0.2 to 0.7 acres per mile of trail or approximately 0.2 percent of the planning

area. Distribution of observed use is as follows: about 1.5 miles (1.0 acres) of OHV trails and 232 miles (57.9 acres) of motorcycle trails. Primary areas of concern are associated with motorcycle trails on and adjacent to steep landforms, such as some of the buttes and cinder cones in the north-central portion of the planning area. Many of the heavily-used trails on steep, hill climbing areas have become entrenched and readily channel runoff water on unprotected soils during high intensity storms. This has resulted in accelerated erosion damage on steep slopes with sensitive soils.

Soil impacts from OHV use within proposed EA units occur on relatively flat ground where exposed mineral soil is less susceptible to accelerated soil erosion. Under both action alternatives, short segments (average length 0.1 to 1.1 miles) of these user-created OHV trails cross through portions of 29 activity areas proposed for mechanical vegetation treatments. The average amount of disturbed soil ranged from 0.1 to 0.4 acres (average 0.2 acres). Due to the size of proposed activity areas, these soil disturbances only accounted for about one (1) percent of the unit area in seven (7) out of the 29 activity areas where off-road trails are known to exist (EA Units 121, 127, 137, 139, 257, 259, and 262). Landforms with steep slopes (over 30 percent) are excluded from the proposed activity areas; so all of the soil impacts within proposed EA units occur on relatively flat ground where exposed mineral soil is less susceptible to accelerated erosion. Existing amounts of detrimentally disturbed soil associated with OHV trails within EA units are included in the estimated percentages displayed in Appendix D.

Livestock Grazing

The project area contains portions of the Sugar Pine Allotment which has been vacant for about ten years. There are no site-specific areas where livestock movement and grazing effects have caused unsatisfactory soil conditions within the forested, transitional range sites of the planning area. The majority of detrimental soil conditions are confined to relatively small areas (about 1.0 acre) around water developments needed to manage livestock (Soils Report, page 12). Salt licks are commonly placed in the immediate vicinity of water sets and these sites are often used as bedding areas, especially where scattered trees exist to provide shade. There are nine historic water-set locations within the project area (see Range Section). Five of these water sets occur within five activity areas (EA Units 82, 109, 124, 130, and 143) proposed under each of the action alternatives. One acre of disturbed soil is included in the estimated amounts of existing detrimental soil conditions for each of these activity areas (Appendix D).

Summary: The existing condition of the soil resource has mainly been influenced by the transportation system and ground-based logging facilities which were used for past timber sales. Most project-related impacts to soils occurred on and adjacent to heavy-use areas such as skid trail systems, log landings, and roads that were used for access in past timber sale units. The extent of detrimentally disturbed soil associated with other land uses is relatively minor in comparison. For activity areas that have already been impacted by previous management, project plans need to include options for avoiding, reducing, and mitigating cumulative levels of existing and predicted amounts of new soil disturbance from project activities.

Appendix D displays quantitative, unit-specific information that shows the predicted amounts of detrimental soil conditions before and after implementation of project activities. The extent

of existing impacts associated with roads, logging facilities, and other management facilities is included in the estimated acres and percentages shown in Column 3 of these tables.

Coarse Woody Debris (CWD) and Surface Organic Matter

The effects of management activities on soil productivity also depend on the amount of CWD and surface organic matter retained or removed on affected sites. Decaying wood on the forest floor is critical for maintaining the soils ability to retain moisture and provide both short and long-term nutrient supplies and biotic habitat for microorganism populations. Mycorrhizal fungi and other soil organisms depend upon the continuing input of woody debris and fine organic matter. A balance between fuel management objectives and ensuring adequate amounts of CWD is an important goal for maintaining long-term soil productivity. Using mycorrhizal fungi as a bio-indicator of productive forest soils, research studies were used to develop conservative recommendations for leaving sufficient CWD following management activities (Graham et al. 1994, Brown et al. 2003). A minimum of 5 to 10 tons per acre of coarse woody debris (greater than 3 inches in diameter) should be retained on dry, ponderosa pine sites and 10 to 15 tons of CWD per acre on mixed conifer sites to maintain soil productivity. A sufficient number of standing dead snags and/or live trees should also be retained for future recruitment of organic matter.

Conserving surface litter (i.e., organic materials such as leaves, twigs and branches less than 3 inches in diameter) is also important for protecting mineral soil from erosion, buffering the effects of soil compaction, and supplying nutrients that support the growth of vegetation and native populations of soil organisms. Surface litter also provides on-site moisture retention.

Current levels of CWD and surface organic matter are unknown for site specific locations throughout the planning area. However, it is expected that adequate amounts of each currently exist to protect mineral soil from erosion and provide nutrients to maintain soil productivity within the majority of previously managed areas. There are some older activity areas, prior to LRMP direction (1990), where management activities likely resulted in less than desired amounts of CWD on the ground. In other portions of the project area, fire suppression has resulted in vegetation conditions that have fuel loadings in excess of historic pre-settlement conditions. Levels of CWD and surface litter in forested areas have been improving towards optimum conditions as additional woody materials have accumulated through natural mortality, windfall, and recruitment of fallen snags over time. Annual leaf/needle fall, small diameter branches, twigs and other forest litter have provided sources of fine organic matter for short-term nutrient cycling and humus development in the mineral soil.

Management Direction

The Pacific Northwest Region developed soil quality standards and guidelines that limit detrimental soil disturbances associated with management activities (FSM 2520, R-6 Supplement No. 2500-98-1). This Regional guidance supplements LRMP standards and guidelines and provides policy for planning and implementing management practices which maintain or improve soil quality. It is consistent with LRMP interpretations for standards and guidelines SL-3 and SL-4 that limit the extent of detrimental soil conditions within activity areas. Standard and Guideline (SL-4) directs the use of rehabilitation measures when the cumulative impacts of management activities are expected to cause damage exceeding soil

quality standards and guidelines on more than 20 percent of an activity area. Standard and Guideline (SL-5) limits the use of mechanical equipment in sensitive soil areas. Management direction requires that when initiating new activities:

1. Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area, including the permanent transportation system;
2. In activity areas where less than 20 percent detrimental soil impacts exist from prior activities, the cumulative amount of detrimentally disturbed soil must not exceed the 20 percent limit following project implementation and restoration; and
3. In activity areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move conditions toward a net improvement in soil quality.

Detrimental soil conditions are those that meet the following criteria:

Detrimental Compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent, or more, over the undisturbed level.
Detrimental Puddling occurs when the depth of ruts or imprints is six inches or more.
Detrimental Displacement is the removal of more than 50 percent of the A horizon from an area greater than 100 square feet, which is at least 5 feet in width.
Severely Burned soils are considered to be detrimentally disturbed when the mineral soil surface has been significantly changed in color, oxidized to a reddish color, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer on an area 100 square feet or greater with a width of at least five feet.

Target Landscape Condition
The primary goal for managing the soil resource is to maintain or enhance soil conditions at acceptable levels without impairment of the productivity of the land. The extent of detrimental soil disturbances is minimized through the application of project design elements, management requirements and mitigation measures designed to minimize, avoid or eliminate potentially significant impacts, or rectifying impacts in site-specific areas by restoring the affected environment. The land effectively takes in and distributes water, and erosion rates are controlled to near-natural levels. The biological productivity of soils is ensured by management prescriptions that retain adequate supplies of surface organic matter and coarse woody debris without compromising fuel management objectives and the risk of soil damage from large-scale stand replacement wildfire.

EFFECTS

Soils

Introduction
The potential for detrimental changes to soil physical properties was quantitatively analyzed by the extent (surface area) of temporary roads, log landings, and designated skid-trail systems that would likely be used to facilitate yarding activities within each of the activity areas

proposed for commercial harvest. Professional judgment was used to evaluate changes in the amount and composition of coarse woody debris and surface organic matter. This analysis also considered the effectiveness and probable success of implementing the management requirements, project design elements, and mitigation measures which are designed to avoid, minimize or reduce potentially adverse impacts to soil productivity.

Alternative 1 – No Action

Detrimental Soil Disturbance

Under Alternative 1 (No Action), the management activities proposed in this document would not take place. No additional land would be removed from production to build roads or other management facilities. Implementation of project design criteria and mitigation measures would not be necessary. There would be no cumulative increase in detrimental soil conditions above current levels. The amount of detrimentally disturbed soil associated with existing roads, logging facilities, and other management facilities is included in the estimates displayed in Appendix D (p.201).

Although disturbed soils would continue to recover naturally from the effects of past management, the current percentages of detrimental soil conditions would likely remain unchanged for an extended period of time. This alternative would defer opportunities for soil restoration treatments that reduce existing impacts and help move conditions toward a net improvement in soil quality.

Soil productivity would not change appreciably unless future stand-replacing wildfires cause intense ground-level heating that results in severely burned soils. Detrimental changes to soil properties typically result from extreme surface temperatures of long duration, such as the consumption of large diameter logs on the forest floor. Although hazardous fuels have been reduced in some previously managed areas, fire exclusion has resulted in undesirable vegetation conditions and excessive fuel loadings in other portions of the project area (see Fire/Fuels Section). Alternative 1 would defer fuel reduction opportunities at this time.

If a large amount of fuel is present during a future wildfire, soil temperatures can remain high for an extended period of time and excessive soil heating would be expected to produce detrimental changes in soil chemical, physical, and biological properties. Severe burning may cause soils to repel water, thereby increasing surface runoff and subsequent erosion. The loss of protective ground cover would also increase the risk for accelerated wind erosion on the loose, sandy textured soils which are widespread throughout the project area.

Under this alternative, the extent of detrimental soil conditions would not increase above existing levels because no additional land would be removed from production to build temporary roads and logging facilities. The effects of past and current management activities were previously described under Existing Condition of the Soil Resource. Appendix D displays existing percentages of detrimental soil conditions for each of the activity areas. This alternative would defer opportunities for soil restoration treatments that reduce existing impacts and would help move conditions toward a net improvement in soil quality. The effects

of future management activities are addressed in a following subsection entitled Foreseeable Actions Common to All Alternatives.

Coarse Woody Debris (CWD) and Surface Organic Matter

In the short term, the amount of coarse woody debris and surface litter would gradually increase or remain the same. In forested areas, coarse woody materials would be expected to continue to increase through natural mortality, windfall, and recruitment of fallen snags over time. Short-term nutrient sources would also increase through the accumulation of small woody material from shrub and tree branches, annual leaf and needle fall, and decomposition of grass and forb plant materials.

In the long term, the accumulation of CWD and forest litter would increase the potential for an uncharacteristic, high intensity wildfire. Intense ground-level fire would likely consume heavy concentrations of fuel and ground cover vegetation. Excessive soil heating would create areas of severely burned soil and increase the potential for accelerated wind and water erosion. The loss of organic matter would adversely affect ground cover conditions and the nutrient supply of affected sites. Over time, burned areas would have increased levels of CWD as fire killed trees are recruited to the forest floor.

Effects Common to Alternatives 2 & 3

The following section provides a discussion of the potential effects on soil physical properties and biological conditions from implementing the various vegetation and fuel reduction treatments proposed under the action alternatives.

Both of the action alternatives are designed to reduce the potential for intense wildfires and their rates of spread by implementation of commercial and non-commercial tree thinning and a combination of various fuel reduction treatments. The action alternatives are essentially the same because the same types and locations of soil disturbance would occur on the same landtypes and existing soil conditions. There is little difference between Alternatives 2 and 3 in terms of the number of activity areas and treatment acres (Alternative 2: 163 activity areas totaling 9,512 acres and Alternative 3: 160 activity areas totaling 9,495 acres). The primary difference is thinning intensities would vary within treatment areas and all of the lodgepole pine and white fir would be removed from treated stands under Alternative 3. The nature of the effects to the soil resource is similar for project activities that use ground-based equipment to accomplish management objectives. After project implementation, including subsoiling mitigation, Alternative 2 is expected to result in approximately 42 acres more detrimental soil conditions than Alternative 3.

The development and use of temporary roads, log landings, and skid trail systems are the primary sources of physical disturbance that would result in adverse changes to soil productivity. Soil condition assessments for similar soils and the same types of ground-based harvest systems, research references, local monitoring reports (including the effectiveness of subsoiling treatments), Lava Cast field investigations, and personal communications with local sale administration and soil scientist personnel were used to predict how much surface area would likely be impacted by logging facilities for this project proposal (Soils Report, pages 15–17). Research studies and local soil monitoring have shown that soil compaction and soil

displacement account for the majority of detrimental soil conditions resulting from ground-based logging operations (Page-Dumroese, 1993; Geist, 1989; Powers, 1999, Deschutes N.F., Soil Monitoring Reports).

No new roads would be constructed and retained as part of the transportation system. Under Alternatives 2 and 3, approximately 32 miles of temporary roads would be established or re-established to allow access to activity areas proposed for commercial harvest. Upon completion of post harvest activities, all temporary road segments would be subsoiled (obliterated) to rehabilitate disturbed soils on compacted road surfaces. Some currently closed roads would be opened to provide necessary access, but these roads would be re-closed following harvest activities. The proposed actions include closing approximately 11 miles of open system roads under Alternative 2 and about 18 miles of road (Alternative 3) following project activities. Road closures do not change the number of acres of detrimentally disturbed soil because the road prism remains in place. Approximately one (1) mile of local system road would be subsoiled and decommissioned from the transportation system under both of the action alternatives.

Commercial harvest proposed under each alternative proposes to utilize a tractor-mounted feller buncher equipped with a felling head (harvester shear). Mechanically harvested trees would be whole-tree yarded to main skid trail networks and rubber-tired grapple machines would then transport the bunched trees to landings for processing and loading. The grapple skidding equipment would be restricted to designated skid trails at all times. It is estimated that skid trails would have an average disturbed width of 12 feet and the average spacing distance between main trails would be approximately 100 feet. On moderately flat ground with small timber, research found that skid trail spacings of 100 feet would account for approximately 11 percent of the unit area (Froehlich, 1981, Garland, 1983). The primary skid trails are not constructed trails when the terrain is gentle to moderately sloping as in the Lava Cast project area. Therefore, surface organic layers are not scraped away by equipment blades or removed off site. These organic materials are either retained near the top of the skid trail, or through operations fluffed to the edges of the trail. It is not mixed deeper into the soil profile, and these organic materials are easily redistributed onto the skid trails during rehabilitation treatments. Based on personal communications with timber sale administrators, the Forest average for log landings is one landing (100 feet by 100 feet) for 10 acres of harvest (approximately 2 percent of the unit area). Disturbed area calculations for log landings are added to the acreage estimates for main skid trails to determine the overall soil disturbance. The majority of soil impacts would consist of soil compaction on heavy use areas (i.e., roads, log landings, and main skid trails) in known locations that can be reclaimed when these facilities are no longer needed for future management. In unmanaged portions of the proposed activity areas, the development and use of new logging facilities would result in approximately 13 percent of the harvest unit areas (11 percent in skid trails plus 2 percent in log landings). This amount was used to analyze the proportionate extent of detrimental soil conditions which are expected to occur in unmanaged portions of activity areas proposed for commercial harvest.

Machine traffic off designated logging facilities would be limited in extent. Mechanical harvesters would only be allowed to make no more than two equipment passes on any site-

specific area between main skid trails or away from log landings. Physical impacts to the soil resource incurred by off-trail machine traffic are generally considered to be detrimental where multiple passes are made by heavy equipment. Research has shown that the detrimental effects of soil compaction generally require more than 3 to 5 equipment passes over the same piece of ground (McNabb and Froehlich, 1983). Therefore, the effects of only two passes are not expected to qualify as a detrimental soil condition. On gentle to moderately sloping terrain, the maneuvering of equipment generally does not remove soil surface layers in areas that are at least 5 feet in width to qualify as detrimental soil displacement (FSM 2520, R-6 Supplement). Smaller areas of displacement or the mixing of soil and organic matter does not constitute a detrimental soil condition.

Past monitoring information was used to predict the extent of new soil disturbance in activity areas that overlap with previously managed areas. The estimates of detrimental soil conditions account for the expected amount of volume removal, the type of logging equipment, the spacing of skid trails, the number of log landings that would be needed to deck accumulated materials, and the fact that not all existing logging facilities can be reutilized due to their orientation within units. Although existing skid trail networks and log landings would be used wherever possible, soil monitoring has shown that commercial thinning treatments generally cause a 5 to 10 percent increase in detrimental soil conditions with each successive entry. An average increase of 7 percent in additional logging facilities was used to analyze the proportionate extent of overlap for previously managed areas that occur within activity areas proposed for this entry. Appendix D displays acres and percentages of detrimental soil conditions for existing conditions and the predicted effects from project implementation, including soil restoration treatments, for each of the activity areas proposed for commercial harvest.

Pre-commercial thinning on approximately 4,864 acres under Alternative 2 and 5,005 acres under Alternative 3 would be accomplished by hand felling small-diameter trees with chainsaws following commercial harvest treatments. Machinery would not be used for yarding these non-commercial materials. Mitigation and resource protection measures would not be necessary for these non-mechanical treatments. Some of these trees would remain on the ground to provide surface cover and a source of nutrients as these organic materials gradually decompose. This would have beneficial effects to site productivity by improving the soils ability to resist surface erosion and providing fine organic matter for humus development in mineral soil.

Fuel Reduction Activities

Under both action alternatives, fuel reduction treatments would include thinning trees, mechanical and hand piling and burning slash materials, mechanical shrub/slash treatments (mowing), and the use of prescribed fire.

Most of the slash generated from commercial harvest would be machine piled and burned on log landings and/or main skid trails. Burning large concentrations of machine-piled logging slash would cause severely burned soil because heat is concentrated in a localized area. However, this slash disposal method would not result in a net increase in detrimental soil conditions because burning would occur on previously disturbed sites. Therefore, there would

be no cumulative increase from the predicted amount of detrimentally disturbed soil associated with the mechanical harvest and yarding activities.

Under both Alternatives 2 and 3, machine piling from designated logging facilities is proposed in portions of 17 activity areas that total approximately 961 acres. Machine piling on temporary roads or main skid trails would have no effect on the extent of detrimentally disturbed soil because equipment would operate off the same logging facilities used during yarding operations. The use of specialized equipment such as tracked excavators and small backhoes with grapple arms are capable of accumulating woody materials without moving appreciable amounts of topsoil into slash piles. This method would not cause additional soil impacts because the piling and burning would occur on previously disturbed sites that already have detrimental soil conditions.

The proposed management activities also include hand treatments for reducing fuel accumulations in portions of 11 activity areas that total approximately 534 acres under Alternative 2 and 13 activity areas that total approximately 867 acres under Alternative 3. The hand pile-and-burn method would be used to burn small concentrations of slash materials that are well-distributed within these activity areas. This non-mechanical fuels treatment does not cause soil displacement or compaction damage. Due to the relatively small-size of hand piles, ground-level heating is usually not elevated long enough to detrimentally alter soil properties that affect long-term site productivity. These activities are conducted at times and under conditions that reduce the risk of resource damage, including impacts to soils and understory vegetation. Soil heating is reduced when the soil surface layer is moist, so piles are typically burned following periods of precipitation. Nutrient releases may actually benefit site productivity in small localized areas. Conservative estimates were used to account for the cumulative amount of surface area that could be potentially impacted from harvest and yarding activities. The cumulative effects to soils from this activity would be minor in comparison. Therefore, the overall extent of detrimental soil conditions is not expected to increase above the predicted levels in any of the activity areas proposed for this post-harvest treatment.

In portions of 64 activity areas that total approximately 4,609 acres under Alternative 2 and 62 activity areas that total approximately 4,606 acres under Alternative 3, specialized machinery with attachments for mowing would be used to reduce the height of tall shrubs and small trees to within four to six inches of the ground. Only brush and light fuels will be mowed, leaving any large-diameter downed logs in place. Prescribed underburning or the hand pile-and-burn method would then be used to reduce ground fuels following the mowing treatment. Brush mowing activities would not cause detrimental soil displacement and increases in soil bulk density are inconsequential. The primary factors that limit soil compaction are the low ground pressure of the tractor and mowing heads, the limited amount of traffic (one equipment pass), and the cushioning effect of surface organic matter. These activities have been monitored in the past, and results show that increases in soil displacement and compaction do not meet the criteria for detrimental soil conditions (Soil Monitoring Report, 1997).

Prescribed burn treatments would be used to reduce fuel accumulations in portions of 60 activity areas that total approximately 5,471 acres under Alternative 2 and 57 activity areas that total approximately 5,212 acres under Alternative 3. Natural fuel accumulations within treatment areas consist mainly of fine fuels (i.e., decadent brush, tree branches, and needle cast litter) that typically do not burn for long duration and cause excessive soil heating. Prescribed

burning activities are conducted at times and under conditions that maximize benefits while reducing the risk of resource damage. Prescribed underburns in timber stands would be accomplished under controlled conditions to minimize damage to standing trees and remove only a portion of the protective surface cover.

Prescribed burn plans would comply with all applicable LRMP standards and guidelines and Best Management Practices (BMPs) prior to initiation of burn treatments. Soil moisture guidelines would be included in burn plans to minimize the risk for intense ground-level heating. Duff moisture levels of approximately 50 percent are typical during light intensity underburns. Soil heating during spring burns would be negligible because higher moisture levels at this time of year generally result in cooler burns with lower potential for causing severely burned soil. Ground cover vegetation is expected to recover rapidly, and it is not anticipated that these burn treatments would accelerate surface erosion above tolerable limits. Fall burning would be conducted following brief periods of precipitation. Ponderosa pine logs and existing snags will be retained to meet coarse woody debris requirements for wildlife habitat and soil productivity. It is expected that adequate retention of coarse woody debris and fine organic matter (duff layer) would still exist for protecting mineral soil from erosion and supplying nutrients that support the growth of vegetation and populations of soil organisms. Therefore, it is expected that there would be no long-term detrimental changes in soil properties. The successful implementation of prescribed underburning treatments would likely result in beneficial effects by reducing fuel loadings and wildfire potential as well as increasing nutrient availability in burned areas (Soils Report, page 18).

It is anticipated that fire lines, both mechanical and hand lines, would be used in conjunction with existing roads and natural barriers to effectively control the spread of fire within treatment units. The extent of disturbed soil would be limited to the minimum necessary to achieve fuel management objectives. In locations where mechanical fuel breaks are necessary, a low-ground pressure ATV machine would pull a small wedge-shaped plow to expose mineral soil in areas approximately 2.5 feet to 3 feet wide. Hand lines would likely be less than 18 to 24 inches in width. Neither method would result in the removal of surface organic layers in large enough areas, at least 5 feet in width as defined in FSM 2520, to qualify as detrimental soil displacement. Soil compaction is not a concern because this activity would be accomplished with a single equipment pass. Displaced topsoil and unburned woody debris would be redistributed over mechanical fire line following prescribed burning activities. Litter from adjacent trees, coupled with the establishment of herbaceous grasses, forbs, shrubs, and tree seedlings will provide new sources of fine organic matter for humus development in the mineral soil.

Soil Restoration Treatments on Temporary Roads and Logging Facilities

Soil restoration treatments would be applied with a self-drafting winged subsoiler to reduce the cumulative amount of detrimentally compacted soil within 76 activity areas proposed under Alternative 2 and 74 activity areas proposed under Alternative 3 which are expected to have soil impacts that exceed 20 percent of the unit area. This would include subsoiling all temporary roads and some of the primary skid trails and log landings following post-harvest activities. The majority of existing and new soil impacts would be confined to these heavy use areas in known locations which facilitates where subsoiling treatments would need to be

implemented on compacted sites. The tables in Appendix D display the number of acres within each harvest unit that would be subsoiled and the percentage of detrimental soil conditions that would remain upon completion of the subsoiling treatment. Subsoiling treatments improve the hydrologic function and productivity by fracturing compacted soil layers and increasing porosity within soil profiles. Subsequently, this contributes to increased water infiltration, enhanced vegetative root development, and improves the soils ability to supply nutrients, moisture, and air that support vegetative growth and biotic habitat for soil organisms. Additional treatment options for improving soil quality on disturbed sites include redistributing topsoil in areas of soil displacement damage and pulling available logging slash and woody materials over the treated surface.

Subsoiling is also planned for an additional six (6) activity areas where either road decommissioning is proposed or the EA units are located near steep buttes with sensitive soils which are susceptible to OHV impacts. Subsoiling treatments would be implemented on some of the logging facilities following their use to reduce the potential for additional OHV impacts in high-use areas adjacent to steep landforms with sensitive soils. Soil restoration acres for EA Units 136, 137, 139, 150, 251 and 252 are included in Appendix D and a site-specific mitigation measure (EA, Chapter 2).

Subsoiling would be applied to decommission approximately one (1) mile of local system road from the transportation system. Road decommissioning that includes subsoiling further reduces the amount of compacted soil within activity areas. Short segments of road, ranging from approximately 0.3 to 0.8 miles (0.5 to 1.2 acres), cross through portions of two (2) activity areas (EA Units 170 and 252) proposed under both Alternatives 2 and 3. Restoration acres within these activity areas were deducted in the disturbed area estimates.

Subsoiling treatments are designed to promote maintenance or enhancement of soil quality. Subsoiling directly fractures compacted soil particles, thereby reducing soil strength and increasing macro pore space within the soil profile. These conservation practices comply with Regional policy and LRMP interpretations for Forest-wide standards and guidelines SL-3 and SL-4 that limit the extent of detrimental soil conditions. Although some activity areas would exceed the 20 percent standard following project implementation, the intent for this project is to move toward and eventually meet the standard over time. Since thinning treatments are proposed for this entry, the transportation system (including main skid trails and log landings) is typically left in place so these established facilities can be re-used for future entries.

As previously described under Affected Environment, extensive areas of the planning area have been covered by loose, non-cohesive ash and pumice deposits that consist mostly of sand-sized soil particles. These coarse-textured soils have little or no structural development within the principal root development zone (4 to 12 inches in depth) where changes in soil compaction (bulk density) are assessed according to Regional direction (FSM 2521.03). Dominant soils are well suited for tillage treatments due to their naturally low bulk densities, low compaction potential, and absence of rock fragments on the surface and within soil profiles. These are the soil properties which are typically affected by mechanical forces that either reduce or improve soil porosity in the compaction zone. Although equipment traffic

during harvest operations can decrease soil porosity on these soil materials, compacted sites can be mitigated physically by tillage with a winged subsoiler (Powers, 1999).

Monitoring of past subsoiling activities on the Deschutes National Forest has shown that these treatments are highly effective in restoring detrimentally compacted soils. The winged subsoiling equipment used on the Deschutes National Forest has been shown to lift and shatter compacted soil layers in greater than 90 percent of the compacted zone with one equipment pass (Craigg, 2000). Field observations have shown that bulk densities return to natural levels after a year or two of physical settling and moisture percolation through the soil profile (Deschutes Soil Monitoring, 1995). Most of the surface organic matter remains in place because the equipment is designed to allow adequate clearance between the tool bar and the surface of the ground for allowing smaller logging slash to pass through without building up. Any mixing of soil and organic matter does not cause detrimental soil displacement because these materials are not removed off site. Since the winged subsoiler produces nearly complete loosening of compacted soil layers without causing substantial displacement, subsoiled areas on this forest are expected to reach full recovery within the short-term (less than 5 years) through natural recovery processes.

Although the biological significance of subsoiling is less certain, these restoration treatments likely improve subsurface habitat by restoring the soils ability to supply nutrients, moisture, and air that support soil microorganisms. Research studies on the Deschutes National Forest have shown that the composition and distributions of soil biota populations rebound back toward pre-impact conditions following subsoiling treatments on compacted skid trails and log landings (Moldenke et al., 2000).

Effects of Implementing Sale-Area Improvement Activities

The interdisciplinary team identified preliminary sale-area improvement opportunities that include additional road closures, weed monitoring, stocking surveys, flagging removal, wildlife guzzler maintenance, additional subsoiling treatments, and implementation of erosion-control practices in site-specific areas. None of these project activities would cause additional adverse impacts that would increase the extent of detrimental soil conditions within any of the proposed activity areas. The rehabilitation of degraded soil conditions associated with user-created OHV trails would have beneficial effects to site productivity by reducing the potential for erosion damage and promoting the recovery of native vegetation on disturbed sites in sensitive areas.

Alternatives 2 & 3

Detrimental Soil Disturbance

The use of ground-based equipment for vegetation management treatments would increase the amount and distribution of soil impacts within the proposed activity areas (Table 3-32 and Appendix D). The development and use of temporary roads, log landings, and skid trail systems are the primary sources of new soil disturbance that would result in adverse changes to soil productivity. Most soil impacts would occur on and adjacent to these heavy-use areas where multiple equipment passes typically cause detrimental soil compaction. The nature of the effects to the soil resource was previously described under Effects Common to Alternatives

2 and 3. Mitigation and resource protection measures would be applied to avoid or minimize the extent of soil disturbance between main skid trails and away from log landings. Non-commercial thinning by hand felling small-diameter trees would not cause additional soil impacts because machinery would not be used for yarding activities.

The amount of surface area committed to temporary roads and new logging facilities would be limited to the minimum necessary to achieve management objectives. Although existing facilities would be used to the extent possible, temporary roads and some additional skid trails and landings would be needed to accommodate harvest and yarding activities. Approximately 32 total miles (48.0 acres) of temporary road would be established or re-established to allow access to 141 activity areas proposed for mechanical vegetation treatments under Alternatives 2 and 3. Many of these spur roads would consist of reopening short segments (0.1 to 1.1 miles) of old access roads from previous entries. None of the temporary road locations would require excavation of cut-and-fill slopes because they are located on nearly level to gentle slopes (less than 5 percent gradient). All temporary road segments would be subsoiled (obliterated) following their use, so the disturbed area estimates are balanced by restoration treatments which are designed to improve soil quality by reclaiming and stabilizing compacted road surfaces.

Since there is only minor overlap with previously managed areas, opportunities to re-use existing skid trail networks and log landings would be limited. Conservative estimates indicate that a total of approximately 1,024 acres of soil would be removed from production to establish designated skid trail systems and log landings within portions of the 164 activity areas proposed under Alternative 2. Approximately 1,007 acres in 160 activity areas would be disturbed by logging facilities under Alternative 3. The tables in Appendix D display existing and predicted amounts of detrimental soil conditions in acres and percentages for each of the individual activity areas following mechanical harvest and subsoiling mitigation treatments.

Mechanical shrub and slash treatments would be accomplished using low ground-pressure machinery that generally causes only short-term disturbances that do not qualify as a detrimental soil condition. The depth of compaction from only one equipment pass would not reduce soil porosity to levels that would require subsoiling mitigation. On gentle to moderately sloping terrain, the maneuvering of equipment generally does not remove soil surface layers in large enough areas to qualify as detrimental soil displacement (FSM 2520, R-6 Supplement). Dominant soils within the project area are not susceptible to soil puddling damage due to their lack of plasticity and cohesion.

Under both action alternatives, soil restoration treatments would be applied with a self-drafting winged subsoiler to reduce the cumulative amount of detrimentally compacted soil within proposed activity areas which are expected to exceed the Regional guidance provided in FSM 2520, R-6 Supplement No. 2500-98-1. Surface area calculations (acres) of designated areas such as roads, main skid trails, and log landings determine how much area needs to be reclaimed within individual activity areas of known size. Under Alternative 2, portions of 84 activity areas would receive subsoiling treatments to rehabilitate approximately 359 acres of compacted soil on specific roads and some of the primary logging facilities. This includes 76 activity areas which are expected to exceed the LRMP standard following harvest activities.

Under Alternative 3, it is predicted that approximately 339 acres of compacted soil would be subsoiled within portions of 82 activity areas. It is predicted that 74 of these activity areas would require soil restoration treatments to comply with management direction. Additional subsoiling is planned for specific activity areas which are located near steep buttes with sensitive soils susceptible to potential OHV impacts. Road decommissioning treatments would include subsoiling to rehabilitate approximately one (1) mile of system road segments that cross through portions of two (2) activity areas (EA Units 170 and 252). Activity areas that would receive soil restoration treatments are identified by unit number in a site-specific mitigation measure (EA, Chapter 2).

Following soil restoration treatments (subsoiling), the extent of detrimental soil conditions relative to existing conditions would either: 1) remain the same, 2) increase, but remain within the LRMP standard of 20 percent, or 3) decrease levels below existing conditions.

Table 3-32 summarizes current, post-harvest, and post-rehabilitation soil conditions within the proposed vegetation treatment units under both Alternatives 2 and 3. This information reflects the net change in detrimental soil conditions for the total area of soil impacts for the combined number of activity areas (EA units) proposed with the action alternatives.

Table 3-32: Summary of net change in detrimental soil conditions following mechanical harvest and soil restoration (subsoiling) treatments proposed for Alternatives 2 & 3.

Net Change in Detrimental Soil Conditions from Existing Condition	Alternative 2			Alternative 3		
	Detrimental Soil Conditions			Detrimental Soil Conditions		
	<=20%	>20%	Total	<=20%	>20%	Total
Existing Condition	119 units 367 acres	44 units 565 acres	163 units 932 acres	118 units 358 acres	42 units 529 acres	160 units 887 acres
Following Harvest	87 units 757 acres	76 units 1,199 acres	163 units 1,956 acres	86 units 760 acres	74 units 1,134 acres	160 units 1,894 acres
Post-Project Condition Following Subsoiling Mitigation	149 units 1,402 acres	14 units 195 acres	163 units 1,597 acres	147 units 1,382 acres	13 units 173 acres	160 units 1,555 acres

Under Alternative 2, it is anticipated that ground-based equipment would be used in portions of 163 activity areas that total approximately 9,512 acres. An estimated total of approximately 932 acres of soil is currently impacted by existing roads, skid trails, log landings, and/or other management facilities within 141 of the 163 activity areas. The analysis indicates that 44 of these activity areas have pre-harvest detrimental soil conditions in excess of 20 percent of the unit area. It is predicted that the direct effects of the proposed harvest and yarding activities would result in a total increase of approximately 1,024 acres of additional soil impacts associated with skid trail systems and log landings. Soil compaction would account for the majority of these impacts and the total amount of detrimental soil conditions would be approximately 1,956 acres prior to soil restoration activities. Portions of 84 activity areas would receive subsoiling treatments to rehabilitate approximately 359 acres of detrimentally

compacted soil on specific roads and some of the primary logging facilities. This would include 76 activity areas which are expected to exceed the LRMP standard plus six (6) additional activity areas where either road decommissioning is proposed or the EA units are located near steep buttes with sensitive soils which are susceptible to OHV impacts. Following subsoiling mitigation, the total amount of detrimentally disturbed soil associated with management facilities is predicted to be approximately 1,597 acres.

The analysis concludes that after project implementation, including subsoiling mitigation, 149 activity areas will have percentages of detrimental soil conditions that are less than or equal to 20 percent of the unit area. It is estimated that 115 activity areas would increase levels above existing conditions by approximately 1 to 13 percent but detrimental soil conditions would remain within the LRMP standard. Forty five (45) activity areas would result in a 1 to 12 percent net improvement in soil quality (less than existing conditions) following soil restoration treatments: Thirty one (31) of these EA Units would be at or below the 20 percent standard. Fourteen (14) EA units would maintain percentages of detrimental soil conditions above the LRMP standard, but they would not exceed existing conditions following subsoiling mitigation (Appendix D).

Under Alternative 3, it is anticipated that ground-based equipment would be used in 160 activity areas that total approximately 9,495 acres. An estimated total of approximately 887 acres of soil is currently impacted by existing roads, skid trails, log landings, and/or other management facilities within 139 of the 160 activity areas. The analysis indicates that 42 of these activity areas have pre-harvest detrimental soil conditions in excess of 20 percent of the unit area. It is predicted that the direct effects of the proposed harvest and yarding activities would result in a total increase of approximately 1,007 acres of additional soil impacts. The total amount of detrimental soil conditions within the 160 activity areas would be approximately 1,894 acres prior to soil restoration activities. Subsoiling treatments would be applied on approximately 339 acres of detrimentally compacted soil on specific roads and some of the primary logging facilities within portions of 82 activity areas. This would include 74 activity areas which are expected to exceed the LRMP standard plus six (6) additional activity areas where either road decommissioning is proposed or the EA units are located near steep buttes with sensitive soils which are susceptible to OHV impacts. Following subsoiling mitigation, the total amount of detrimentally disturbed soil associated with management facilities is predicted to be approximately 1,555 acres.

The analysis concludes that after project implementation, including subsoiling mitigation, 147 activity areas will have percentages of detrimental soil conditions that are less than or equal to 20 percent of the unit area. It is estimated that 112 activity areas would increase levels above existing conditions by approximately 1 to 13 percent but detrimental soil conditions would remain within the LRMP standard. Forty five (45) activity areas would result in a 1 to 12 percent net improvement in soil quality (less than existing conditions) following soil restoration treatments: Thirty two (32) of these EA units would be at or below the 20 percent standard. Thirteen (13) EA units would maintain percentages of detrimental soil conditions above the LRMP standard, but they would not exceed existing conditions following subsoiling mitigation (Appendix D).

There is no significant difference between Alternatives 2 and 3 in terms of the percentage of harvested acres with detrimental soil impacts following mechanized harvest and soil rehabilitation activities. Implementation of Alternative 2 would result in a slightly greater extent of detrimental soil conditions than Alternative 3 which would have less overall soil impacts due to fewer activity areas and treatment acres. The total number of acres with detrimental soil conditions is predicted to be approximately 1,597 acres under Alternative 2 and 1,555 acres under Alternative 3, or a difference of 42 acres.

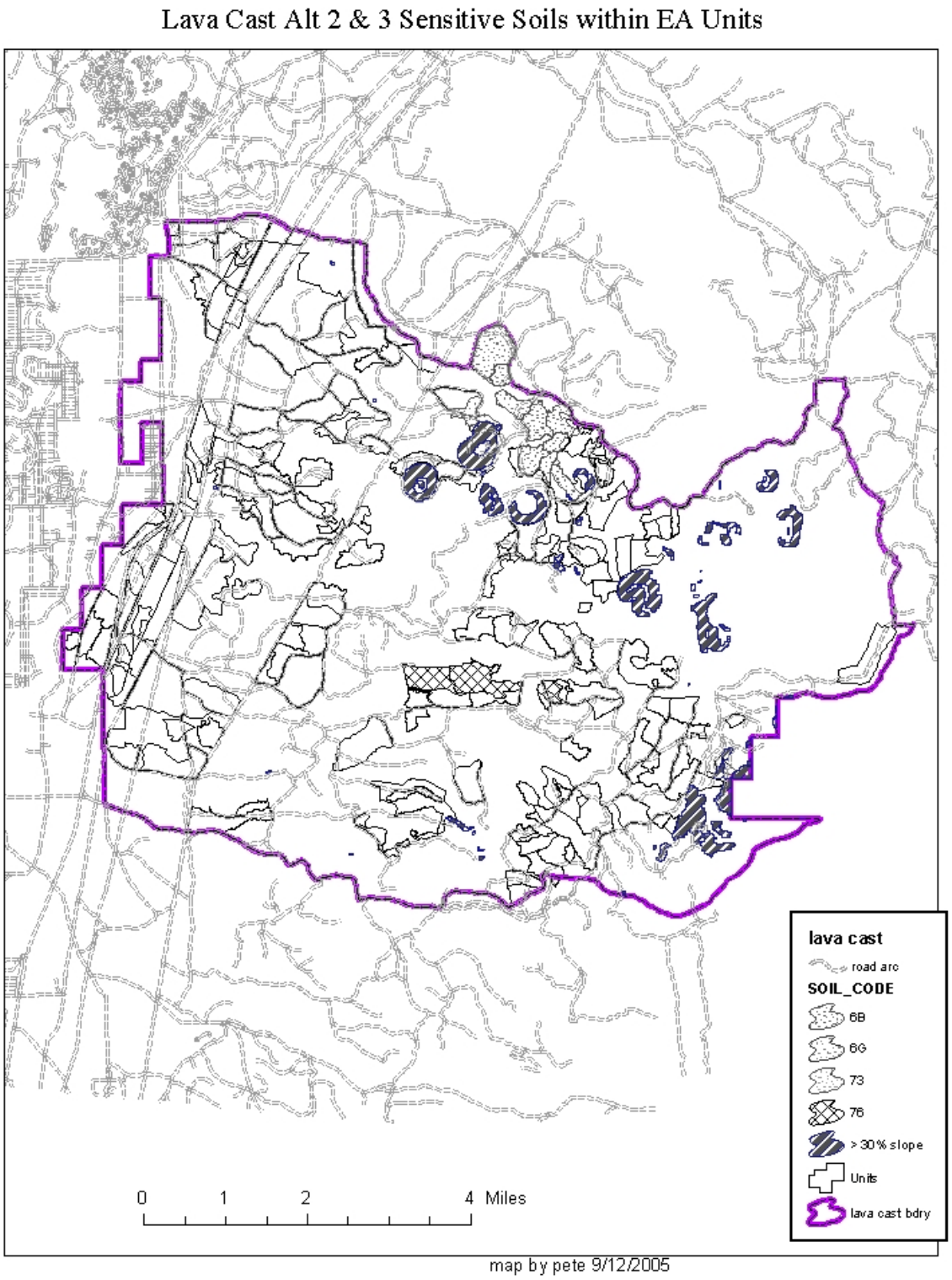
Although a few activity areas (14 EA units in Alternative 2 and 13 EA units in Alternative 3) would exceed the 20 percent standard following project implementation, the intent for this project is to move toward and eventually meet the 20 percent standard over time. Since thinning treatments are mainly proposed for this entry, the transportation system (including main skid trails and log landings) is typically left in place so these facilities can be reused for future entries.

The harvest and restoration treatments (subsoiling) proposed in both action alternatives are consistent with Regional policy (FSM 2520, R-6 Supplement) and LRMP interpretations for Forest-wide standards and guidelines SL-3 and SL-4 that limit the extent of detrimental soil conditions. In harvest units where less than 20 percent detrimental impacts exist from prior activities, the cumulative amount detrimentally disturbed soil would not exceed the 20 percent limit following project implementation and restoration activities. In harvest units where more than 20 percent detrimental impacts currently exist from prior activities, the cumulative detrimental effects would not exceed conditions prior to the planned activity and some units would result in a net improvement in soil quality. Both action alternatives balance the goal of maintaining and/or improving soil quality following project implementation and soil restoration activities.

Sensitive Soils

Both Alternatives 2 and 3 propose mechanical harvest treatments on landtypes that contain sensitive soils. Figure 3-8 shows locations where portions of the proposed activity areas overlap areas with slopes greater than 30 percent and/or low productivity sites where rocky lava flows (SRI Soil Code 76) or climatic factors limit regeneration potential (SRI Soil Codes 6B, 6G, and 73).

Figure 3-8 Activity areas proposed for mechanical vegetation treatments that overlap landtypes with sensitive soils in localized areas.



Most activity areas proposed for mechanical vegetation treatments do not occur on landtypes that contain sensitive soils. Approximately 806 acres (8 percent) of the total acres proposed for mechanical treatment are located on landtypes that contain sensitive soils in localized areas. The majority of overlap occurs on low productivity sites where the potential for successful regeneration is limited by frost heaving, low fertility and climatic factors. None of the proposed activity areas overlap landtypes that contain soils with a high erosion hazards or potentially wet soils with seasonally high water tables that would require special mitigation.

Total affected landtype acres and proposed units that contain sensitive soils are displayed by concern category in Table 3-33. Activity areas proposed for mechanical treatments on landtypes that contain sensitive soils are identified by unit number in project design criteria (EA, Chapter 2). Limitations for equipment use would be enforced to avoid and/or minimize potentially adverse effects in activity areas that contain steep slopes with sensitive soils.

Table 3-33: Activity area (acres) proposed for mechanical vegetation treatments on landtypes that contain sensitive soils.

Sensitive Soil Categories	Alternatives 2 and 3
Slopes greater than 30 percent	25 acres (total) EA Units: 138, 139, 143, 178, 249, and 251
Soils with variable depths in areas of rocky lava flows	288 acres (total) EA Units: 162, 167, 242, and 246
Low productivity sites limited by frost heaving, low fertility and climatic factors	493 acres (total) EA Units: 45, 85, 128, 138, 150, 151, 156, 157, 158, 249, and 252

Soil displacement from harvest activities occurs when soil organic layers are scraped or pushed away by equipment or gouged by logs during skidding operations. This type of soil disturbance is most likely to occur on the steeper portions of harvest units. In order to avoid soil displacement damage, activity area boundaries would be adjusted to prohibit equipment operations in portions of activity areas that contain slopes steeper than 30 percent. There would be no new construction of temporary roads or logging facilities in areas with steep slopes. Steep portions of proposed harvest units will be included as untreated patches to meet wildlife objectives. The majority of proposed activity areas are located on gentle to moderately sloping terrain where the maneuvering of equipment generally does not remove soil surface layers in areas that are at least 5 feet in width (FSM 2520). Smaller areas of soil displacement or the mixing of soil and organic matter would not constitute detrimental soil displacement.

The potential for successful regeneration is limited by properties such as soil depth, soil fertility, and temperature extremes on low productivity sites such as frost pockets, cold air drainages, and areas of rocky lava flows. Under both action alternatives, all proposed activity areas currently have adequate stocking levels and meet criteria for land suitability that would allow them to be regenerated or resist irreversible resource damage. This indicates that management concerns associated with these sites were successfully addressed by past silvicultural practices.

Subsoiling treatments would occur on portions of two activity areas (EA Units 167 and 246) that overlap landtypes containing soils with variable depths on rocky lava flows. Although rock fragments on the surface and within soil profiles can limit subsoiling opportunities, hydraulic tripping mechanisms on winged subsoiling equipment helps reduce the amount of subsurface rock that could potentially be brought to the surface by other tillage implements. Most of the surface organic matter and smaller logging slash would remain in place because the equipment is designed to allow adequate clearance between the tool bar and the surface of the ground.

Coarse Woody Debris (CWD) and Surface Organic Matter

CWD and surface organic matter were evaluated qualitatively based on the probable success of implementing appropriate Best Management Practices and recommended guidelines that address adequate retention of these important landscape components to meet soil productivity and wildlife habitat objectives (see Wildlife effects section and Chapter 2 Mitigation). Based on guidelines for estimating tons per acre of CWD (Brown, 1974 and Maxwell, Ward, 1980), the levels of CWD retention to meet wildlife habitat objectives (Eastside Screens direction) would meet objectives for maintaining soil productivity.

The proposed harvest activities would reduce potential sources of future CWD, especially where mechanized whole-tree yarding is used in activity areas. There is little difference between Alternatives 2 and 3 in terms of the number of activity areas and treatment acres. Harvest activities recruit CWD to the forest floor through breakage of limbs and tops during felling and skidding operations. Existing down woody debris, other than lodgepole pine, would be protected from disturbance and retained on site to the extent possible. Understory trees, damaged during harvest operations, would also contribute woody materials that provide ground cover protection and a source of nutrients on treated sites. It is expected that enough broken branches, unusable small-diameter trees, and other woody materials would likely be available after mechanical thinning activities to meet recommended guidelines for CWD retention.

Fuel reduction treatments would also reduce CWD and some of the forest litter by burning logging slash and natural fuel accumulations. Most of the logging slash generated from commercial harvest would be machine piled and burned on log landings and/or main skid trails. Post-harvest review by fuel specialists would determine the need for prescribed underburn treatments, especially where fine fuel accumlations increase the risk of wildfire to unacceptable levels. Burning would occur during moist conditions to help ensure adequate retention of CWD and surface organic matter following treatment. Fuel reductions achieved through planned ignitions usually burn with low-to-moderate intensities that increase nutrient availability in burned areas. Low intensity fire does not easily consume material much larger than 3 inches in diameter, and charring does not substantially interfere with the decomposition or function of coarse woody debris (Graham et al., 1994). Although prescribed burn treatments are not intended to kill residual trees, tree mortality in varying amounts will occur during project implementation. Any dead trees killed from prescribed burn treatments will eventually fall to the ground and become additional sources of CWD. Depending on the rate of decay and local wind conditions, many of the small-diameter trees (less than 10 inches)

would be expected to fall within the short-term (less than 5 years). In the long term, there is likely to be no measurable difference in the quantity or distribution of CWD associated with fuel treatments under either alternative.

A cool-temperature prescribed burn would remove some of the surface litter and duff materials without exposing extensive areas of bare mineral soil. Some of the direct and indirect beneficial effects to the soil resource include: 1) a reduction of fuel loadings and wildfire potential, 2) increased nutrient availability in localized areas, and 3) maintenance of organic matter that supports biotic habitat for mycorrhizal fungi and microorganism populations. The positive effects of short-term nutrient availability would likely be somewhat greater under Alternative 2 because it prescribes the use of underburning on slightly more acres than Alternative 3.

Effects on the soil resource include all past, present, and reasonably foreseeable actions that cause soil disturbance within the same activity areas analyzed under the direct and indirect effects of implementing the proposed actions. Alternatives 2 and 3 would both cause some new soil disturbances where ground-based equipment is used for mechanical harvest and yarding activities during this entry. The combined effects of past and current disturbances and those anticipated from implementing the proposed actions were previously addressed under existing conditions and the discussion of direct and indirect effects. The primary sources of detrimental soil conditions from past management are associated with existing roads and ground-based logging facilities which were used for harvest activities between 1966 and 2002. Likewise, the majority of project-related soil impacts from this entry would also be confined to known locations in heavy use areas (such as roads, log landings, and main skid trails) that can be reclaimed through subsoiling treatments. Appendix D displays acres and percentages of detrimental soil conditions for existing conditions and the predicted effects from project implementation, including soil restoration treatments, for each of the activity areas proposed for commercial harvest under the action alternatives. The net change in detrimental soil conditions is associated with additional logging facilities that would be retained following post-harvest soil restoration treatments. The following provides a summary discussion of the conclusions.

Under Alternative 1 (No Action) the extent of detrimental soil conditions would not increase above existing levels because no additional land would be removed from production to build temporary roads and logging facilities. This alternative would defer opportunities for soil restoration treatments that would reduce existing impacts and help move conditions toward a net improvement of soil quality.

Under Alternative 2, an estimated total of approximately 932 acres of soil is currently impacted by existing roads, skid trails, log landings, and/or other management facilities within 141 of the 164 activity areas. The analysis indicates that 44 of these activity areas have pre-harvest detrimental soil conditions in excess of 20 percent of the unit area. Based on disturbed area estimates after project implementation, including subsoiling mitigation, the total amount of detrimentally disturbed soil associated with management facilities is predicted to be approximately 1,600 acres. Fourteen (14) EA units would maintain percentages of detrimental

soil conditions above the LRMP standard, but they would not exceed existing conditions following subsoiling mitigation.

Under Alternative 3, an estimated total of approximately 887 acres of soil is currently impacted by existing roads, skid trails, log landings, and/or other management facilities within 139 of the 161 activity areas. The analysis indicates that 42 of these activity areas have pre-harvest detrimental soil conditions in excess of 20 percent of the unit area. Based on disturbed area estimates after project implementation, including subsoiling mitigation, the total amount of detrimentally disturbed soil associated with management facilities is predicted to be approximately 1,558 acres. Thirteen (13) EA units would maintain percentages of detrimental soil conditions above the LRMP standard, but they would not exceed existing conditions following subsoiling mitigation.

There are no violations of Regional policy (FSM 2520, R-6 Supplement) or LRMP Standards and Guidelines SL-3 and SL-4 under either alternative because the project will not cause an activity area to move from a detrimental soil condition less than 20 percent to one that is greater than 20 percent; nor will the project increase detrimental soil conditions in activity areas that currently exceed 20 percent of the unit area.

The combined effects of slash disposal and other fuel reduction treatments are not expected to cause cumulative increases in detrimental soil conditions.

Project Design and Resource Protection Measures

Under both action alternatives, project implementation includes the application of management requirements, project design elements and mitigation measures to avoid, minimize, or rectify potentally adverse impacts to the soil resource (EA, Chapter 2). Operational guidelines for equipment use provide options for limiting the amount of surface area covered by logging facilities and controlling equipment operations to minimize the potential for soil impacts in random locations of harvest units. Existing logging facilities would be re-utilized to the extent possible. Grapple skidders would only be allowed to operate on designated skid trails spaced on average of 100 feet apart (11 percent of the unit area). The amount of traffic off designated logging facilities by mechanical harvesters and other specialized machinery would limited in extent. Equipment operations would be avoided in portions of harvest units that contain steep slopes over 30 percent. Other requirements include avoiding equipment operations during periods of high soil moisture and operating equipment over frozen ground or a sufficient amount of compacted snow.

All reasonable Best Management Practices (BMP) would be applied to minimize the effects of road systems, fuels and timber management activities on the soil resource. The BMPs are tiered to the Soil and Water Conservation Practices Handbook (FSH 2509.22), which contains conservation practices that have proven effective in protecting and maintaining soil and water resource values.

Soil restoration treatments would be applied to rectify impacts by reclaiming and stabilizing detrimentally disturbed soils committed to roads and logging facilities. Monitoring of past subsoiling activities on the Deschutes National Forest has shown that these treatments are

highly effective in restoring detrimentally compacted soils. Subsoiled areas are expected to reach full recovery within the short-term (less than 5 years) through natural recovery processes. Restoration treatments, such as subsoiling, are consistent with Regional policy and LRMP interpretations of standards and guidelines SL-3 and SL-4.

Soil moisture guidelines would be included in prescribed burn plans to minimize the potential for intense ground-level heating and adverse effects to soil properties. Under all action alternatives, guidelines for adequate retention of coarse woody debris and fine organic matter are included as management requirements to assure both short-term and long-term nutrient cycling on treated sites.

Foreseeable Actions Common to All Alternatives

Future management activities are assumed to occur as planned in the Schedule of Projects for the Deschutes National Forest. From what is known about reasonably foreseeable future actions, no ground-disturbing management activities are currently scheduled in areas that would overlap with any of the activity areas proposed with this project. No out-year timber sales associated with the East Tumbull, 18 Fire Salvage, Fuzzy, and Opine planning areas or BLM projects in the La Pine basin are located within the Lava Cast project area boundaries. There is no overlap of treatment areas associated with the Lava Cast Timber Stand Improvement Treatments (CE) and the Lava Cast Fuels (CE).

On-going fuel reduction activities include approximately 55 acres of non-mechanical thinning and prescribed burning treatments within one remaining unit of the Lava Cast Forest Demo Thinning project. The successful implementation of these treatments would likely result in some beneficial effects to soils in different locations of the project area by reducing fuel loadings and increasing nutrient availability in burned areas.

None of the planned locations for new water developments associated with the Cinder Hill Range Allotment EA occur in areas that overlap with any of the EA units proposed with this project. The Tract C land conveyance parcel was excluded from the activity areas planned for this project. The construction of the interchange along US Highway 97 at the Sunriver junction affects approximately 19 acres of three activity areas (Units 54, 55, and 57) in the northern portion of the project area. Since vegetation and fuel reduction treatments will no longer be necessary in the construction zone, the boundaries for these activity areas were adjusted to exclude the affected areas near the highway. The Noxious Weed Control EIS would likely implement various treatments to control invasive plants in site-specific areas within the project area. These future activities are not expected to cause any detrimental changes in soil properties. Small areas of soil displacement or the mixing of soil and organic matter would not meet criteria considered detrimental to soil productivity. It is also unlikely that herbicide treatments would cause any adverse direct or indirect effects to soil productivity (18 Fire Herbicide Treatment Environmental Assessment, Soils Report, 2005). The Forest Access Management Plan will likely include the development of new OHV trail systems and other recreation facilities, but the exact locations are unknown at this time. Therefore, none of these future actions (above) are expected to result in a cumulative increase in the extent of detrimental soil conditions beyond the predicted levels displayed for each of the proposed activity areas in Appendix D.

Other foreseeable future activities include continued recreation use, firewood cutting within the McKay wood cutting area, standard road maintenance, and prescribed maintenance burning to reduce fuel densities and the risk for future wild land fires.

The effects of recreation use would be similar to those described for Existing Condition of the Soil Resource. Future soil disturbances would be confined mainly to small concentration areas that would have a relatively minor effect on overall site productivity. Developed recreation facilities are excluded from the proposed activity areas, so they do not increase the estimated percentages of existing detrimental soil conditions for any of the activity areas displayed in Appendix D. Impacts from dispersed recreation activities are usually found along existing roads and trails where vegetation has been cleared on or adjacent to old logging facilities in past harvest areas. Soil disturbances from future recreation use are expected to occur in similar locations. Incidental disturbances from hikers and mountain bikers are not expected to have a measurable effect on site productivity within the individual activity areas proposed for this project. There are no major soil-related concerns associated with the combined effects of these future activities.

The continued use of the McKay firewood cutting area, currently about 3,300 acres in size, is anticipated through December 1, 2007. Soil impacts would be similar to those described for Existing Condition of the Soil Resource. The adverse effects of soil compaction on user-created woodcutting roads account for the majority of detrimental soil conditions from these activities. Conservative estimates were used to account for the existing percentage of detrimental soil conditions associated with logging facilities and woodcutter roads within portions of 36 activity areas proposed within the firewood cutting area. Existing logging facilities and woodcutter roads currently provide adequate access. Subsoiling mitigation would be applied to reduce the cumulative amount of detrimentally compacted soil in these areas. Consequently, the extent of detrimental soil conditions is not expected to increase above the predicted levels displayed for each of the proposed activity areas (Appendix D).

Road maintenance activities would reduce accelerated erosion rates where improvements are necessary to correct drainage problems on specific segments of existing road. Surface erosion can usually be controlled by implementing appropriate Best Management Practices (BMPs) that reduce the potential for indirect effects to soils in areas adjacent to roadways. There are no major soil-related concerns associated with the combined effects of these future activities.

The effects of prescribed maintenance burning would be similar to those described for the direct and indirect effects common to Alternatives 2 and 3. These complimentary activities would be conducted under carefully controlled conditions that maximize benefits while reducing the risk for resource damage. Prescribed burn plans would comply with all applicable LRMP standards and guidelines and BMPs prior to initiation of burn treatments. Soil moisture guidelines would be included in burn plans to minimize the risk of intense heating of the soil surface. The successful implementation of these proposed activities would likely result in beneficial effects by reducing fuel loadings and wildfire potential as well as increasing nutrient availability in burned areas.

There are no measurable cumulative effects expected on the amount or presence of CWD and surface organic matter associated with any reasonable and foreseeable actions. These future activities would occur on gentle to moderately sloping terrain where ground disturbances typically do not remove soil surface layers in large enough areas to qualify as a detrimental soil condition.

Under Alternatives 2 and 3, the cumulative effects from the proposed actions combined with all past, present, and reasonably foreseeable management activities comply with Regional policy (FSM 2520, R-6 Supplement) and LRMP direction for planning and implementing management practices in previously managed areas.

Short-Term Uses of the Human Environment and the Maintenance of Long-Term Productivity

Project design, LRMP management requirements and mitigation measures built into the action alternatives ensure that long-term productivity will not be impaired by the application of short-term management practices. The action alternatives would improve soil productivity in specific areas where soil restoration treatments (subsoiling) are implemented on soils committed to roads and logging facilities.

HERITAGE RESOURCES

Scope of the Analysis

Heritage analysis focused primarily on known sites within the project area, but also in proposed activity areas. Portions of the project area have been surveyed for heritage resources. Some of these surveys date back to the early 1980s; many do not approach current standards for technical thoroughness. Cultural resource records indicate that 18 surveys have been completed. Of that number, one is provisionally acceptable and 11 are not acceptable because of technical deficiencies.

The Area of Potential Effect (APE) of the Lava Case Project consists of the EA units rather than the entire project area. Very few of the EA units have been completely covered by surveys. The cultural resources technical report will provide detailed information on the acreage and location of acceptable survey by EA unit.

"Evaluation status" refers to eligibility for the National Register of Historic Places. Fourteen of the sites are unevaluated and three are of unknown evaluation status. All but one of the evaluated sites has been determined to be Not Eligible.

Affected Environment and Existing Conditions

Between 1981 and 2000, 20 projects have inventoried portions of the current project analysis area for cultural resources. Of these projects, 12 were conducted and documented adequately to be considered previous adequate survey. These previous surveys covered approximately 8,000 acres in the project analysis area to an adequate standard.

Through these past surveys, 58 heritage sites have been located and recorded. Current surveys between 2002 and 2006 identified an additional eight sites and two isolates. Sites are defined

by having 10 or more artifacts or the presence of features such as a cave, rock art, fire pit remains, structure, etc. Isolates are defined as not having any features and locating less than 10 artifacts. Three of these sites have been evaluated as significant and eligible for inclusion on the National Register of Historic Places. Ten sites have been evaluated as not eligible. The remaining 45 sites have not been evaluated.

Site evaluations were completed by applying the criteria for eligibility in 36CFR60.4. For prehistoric sites, information potential was determined by assessing research value or potential as addressed in research topics presented in the Deschutes County Prehistoric Context Statement (Houser, 1996) and Management Strategy for Treatment of Lithic Scatter Sites (Keyser et al, 1988).

No areas of specific tribal interest resources are identified in the project area. No significant populations of tribal use plants or locations of tribal traditional use are known. The Warm Springs, Paiute, and Wasco Tribes from The Confederated Tribes of the Warm Springs Reservation of Oregon are the known tribes with historic associations to this area. The project area is within lands ceded to the Federal Government by The Confederated Tribes of the Warm Springs Reservation of Oregon under treaty in 1855 and ratified by Congress in 1859.

EFFECTS

Heritage Resources

Alternative 1 - No Action

Under the no action alternative, no direct effects to heritage resources would occur since no management activities would take place. The area would continue to be at high risk of catastrophic wildfires that could adverse impact the heritage resources in the area. Unmanaged fuels in the project area would continue to pose a risk of wildfire. Wildfire and wildfire suppression activities both have significant effects on cultural resources.

The flame and heat from wildfires directly affect archeological materials on the ground surface. High temperature fires have the potential to damage most classes of archaeological artifacts and features. The longer the artifacts and features are in contact with high heat, the greater the damage. Where downed logs burn on top of an archaeological site, the heat effects extend well into the soil column, affecting artifacts that would otherwise be protected by a mantle of insulating soil.

Fire affects the chronological information preserved in prehistoric sites. A radioactive carbon isotope exists in all living things. Radiocarbon dating measures the rate of decay of this isotope after an organism dies. Fire contaminates radiocarbon samples with recent ash and charcoal, physically and chemically altering the datable material, and destroying the ability to date the site. Obsidian hydration is another dating technique that measures the amount of moisture absorbed by obsidian artifacts. This moisture accumulates at a steady rate and forms a microscopic band on the surface of the artifact. By measuring the thickness of the band, the relative age of the artifact can be estimated. Exposure to high heat significantly alters this hydration band, destroying its dating potential.

Rock art sites are susceptible to damage by fire and can be completely destroyed by the heat and smoke. Painted elements (pictographs) can be smoke damaged while pecked elements (petroglyphs) on basalt can exfoliate in the high heat. Rock art is often located on vertical sides of boulders or cliff faces where the heat of wildfires is often concentrated. These surfaces can become superheated, particularly when vegetation is present against the stone surface.

Fire also damages historic artifacts, increasing the oxidation of metal artifacts, melting glass, and cracking or breaking pottery and altering or removing decorative paints. Organic materials such as wood, shell, bone, antler, horn, leather, and cloth would be burned or otherwise damaged if exposed to flame or smoke.

Prehistoric and historic sites are often protected from artifact looting by obscuring vegetation. When wildfire removes this vegetation, sites and artifacts become more vulnerable to artifact theft and vandalism. Since artifact theft from public lands is a substantial problem in central Oregon, this effect is particularly significant in this project area.

In addition to the direct and indirect effects of fire itself, suppression of wildfires with the use of mechanized equipment may damage archaeological sites.

Alternatives 2 & 3

Alternatives 2 and 3 vary primarily in harvest prescriptions and in fuels treatment within the proposed units. The ground disturbing characteristics of the implementing methods are essentially the same, therefore Alternatives 2 and 3 are analyzed together.

Both action alternatives have proposed activity in the vicinity of approximately 20 heritage sites that are unevaluated. These sites would be avoided by project activities to maintain the significance or potential significance of the site.

Most sites in the project areas have existing disturbance from historic and recent timber harvest, road construction and use, or recreational activities. Artifact collection of both prehistoric and historic materials is likely to have occurred through time. Most sites also have disturbance from natural causes such as rodent and insect burrowing, trees falling with root wad disturbing soils, soil erosion, and natural wildfires through the area. By avoiding direct and indirect effects, no additional effects would accumulate to these sites.

Management of timber and vegetation for fuel reduction or merchantable wood products typically involves activities that cause ground disturbance. Where ground disturbance occurs in the same or close locale with cultural resources, damage to the cultural resource can occur. These activities include prescribed fire and underburning with mechanical pretreatment, tree falling, slash pile burning, thinning from below with mechanized equipment, and underburning.

The standard practice for protection of significant or unevaluated cultural resources is to avoid surface disturbance within the boundaries of individual cultural resources. Evaluated sites identified as not significant are normally released from further management—five sites are in this category. The 20 sites in the vicinity of project activities would be avoided during operations.

BOTANY

Scope of the Analysis

This Biological Evaluation (BE; located in the project file) documents the review and review findings of Forest Service planned programs and activities for possible effects on species (1) listed or proposed for listing by the USDI Fish and Wildlife Service (USFWS) as Endangered or Threatened; (2) designated by the Pacific Northwest Regional Forester as Sensitive. It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, FSM 10/89 R-6 Supplement 47 2670.44, and the Endangered Species Act (ESA) of 1973 (Subpart B; 402.12, Section 7 Consultation).

Proposed, Endangered, Threatened, or Sensitive (PETS) species considered in this evaluation are those listed in FSM 2670.4 Region 6 list dated April 1999 as suspected or documented to occur on the Deschutes National Forest. Listed plant species and their listing status are in BE.

Affected Environment and Existing Conditions

The project area is characterized by a ponderosa pine/bitterbrush/Idaho fescue plant association, and sandy to loamy volcanic soils. Elevation is at roughly 4000' – 5500'. In surveys completed periodically between 1990-1999, no known Proposed, Endangered, Threatened, or Sensitive plant species have been found within the project area, nor has high-probability PETS plant habitat ever been found in this area. The species most likely to be found is *Castilleja chlorotica* (green-tinged paintbrush).

The potential for sensitive plant species' habitat to occur in the project area was evaluated using the preceding information. Resources used to identify potential sensitive plant habitat were aerial photo interpretation, vegetation map information, as well as personal knowledge of the project area.

There are no known sites for PETS plant species within the project area.

Based on the preceding information, a comparison with the habitat requirements of Bend/Ft. Rock Ranger District potential sensitive species, including three mosses, two lichens, and one fungus added to the list in summer 2004 indicates that the following species has a low probability of occurring within the project area:

Species	Probability
Castilleja chlorotica (Green-tinged paintbrush)	Low

No habitat for Threatened, Endangered, or Proposed (Candidate) plant species (these species, and their habitats, are listed in Appendices C and D) exists within the project area, with the possible exception of *Botrychium lineare,* a Candidate species. Its range distribution is very wide and its habitat varies just as widely. However, it has not been found on the Deschutes National Forest, (nor more specifically in the project area), after 14 years of project-level surveys, which include complete lists of plants encountered. The nearest known site lies in northeastern Oregon, in Wallowa County.

As for the new lichens, mosses, and fungus added to the Forest list in summer 2004, there is no habitat present for them in the project area. They are associated either with flowing streams in moist, high-elevation forests, and/or moist, high-elevation forests in the Cascades.

EFFECTS

Botany

Alternative 1 - No Action

TES Species
No effects were identified because no PETS plants were located during survey, and suitable, likely habitat was not encountered.

Invasive Weeds
There are no anticipated direct or indirect effects from implementation of this project. OHV use continues to increase in the project area, bringing with it the possibility of new weed introductions.

There is always the risk that the public, entering the Forest in their vehicles (passenger, trucks, OHV's, bicycles, etc) or pack animals will introduce new weed populations. This cannot be dealt with at the project level, but rather is being addressed through broader public education efforts.

Alternatives 2 & 3

TES Species
No effects were identified because no PETS plants were located during survey, and suitable, likely habitat was not encountered.

Invasive Weeds
There are no anticipated direct or indirect effects from implementation of this project, if the mitigations are followed.

OHV use continues to increase in the project area, bringing with it the possibility of new weed introductions.

There is always the risk that the public, entering the Forest in their vehicles (passenger, trucks, OHV's, bicycles, etc) or pack animals will introduce new weed populations. This cannot be dealt with at the project level, but rather is being addressed through broader public education

efforts.

INVENTORIED ROADLESS (IRA) AND UNROADED AREAS

Scope of the Analysis

The existing North Paulina Roadless Area was considered for this analysis. A portion of it is in the southeast portion of the Lava Cast planning area.

Affected Environment and Existing Conditions

Approximately 383 acres of the North Paulina IRA lies within the Lava Cast planning area. It also lies within Newberry National Volcanic Monument. The FEIS for Newberry National Volcanic Monument Comprehensive Management Plan and Appendix C of the FEIS for the Deschutes National Forest Land and Resource Management Plan (LRMP) identify this roadless area as the North Paulina Roadless Area. The FEIS for the Monument Plan (Pages 196-199) and the Deschutes LRMP (Appendix C-7 and C-48 through C-61) include descriptions and maps of the roadless areas. The remainder of this section summarizes information from these documents.

The North Paulina Roadless Area is approximately 22,000 acres and surrounds the northwest flank of Newberry Caldera. It was considered for formal wilderness designation during the Roadless Area Review and Evaluation (RARE II) process in the 1980s. It was not included for formal wilderness designation and was absorbed into Newberry National Monument and its legislation in 1990.

Recreational use is low. Overall, the opportunity for primitive recreation is low (Appendix C, Deschutes LRMP). This is due primarily to the lack of diverse recreational opportunities compared to other existing wilderness and undeveloped areas. Overall, there is moderate opportunity for solitude (Appendix C, Deschutes LRMP). The Roadless Area is not large enough to adequately buffer outside influences, especially noise.

Unroaded Areas

Unroaded areas are defined in the FEIS for the Roadless Area Conservation Final Rule as "any area, without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with the inventoried roadless area" (USDA Forest Service 2000). Unroaded areas have typically not been inventoried and are, therefore, separate from inventoried roadless areas. This document uses the term "unroaded area" to differentiate these areas from inventoried roadless areas. There are no Forest-wide or Management Area standards specific to unroaded areas in the Deschutes Forest Plan. The Deschutes LRMP allocates these unroaded areas as General Forest (GFO), Old Growth (OGR), and Scenic Views Partial Retention Middleground (SV4).

During project scoping in 2004, the Oregon Natural Resources Council (ONRC; now Wild Oregon) submitted a map that displays three unroaded areas within the Lava Cast planning area. ONRC stated that activities that enter this area threaten to degrade the special character of these unroaded areas.

There are no water resources within the unroaded areas. Consequently, the unroaded areas do not provide a source of public drinking water. There is habitat for threatened, endangered, proposed, candidate, or sensitive species that corresponds with the OGMA designation. These areas provide the recreation activity, setting, and experience (Recreation Opportunity Spectrum) of roaded modified or roaded natural. Most of the areas have been heavily modified by human activity. Harvest activities have occurred on a majority of the acres in the ONRC areas. Access to the perimeter of the areas is generally easy for highway vehicles. There are no known traditional cultural properties or sacred sites in the unroaded areas. No unique characteristics have been identified within the unroaded areas.

The first of the areas (that partially coincides with Lava Cast Forest) is mostly within Newberry National Volcanic Monument and a large portion of it consists of lava. However, portions or all of proposed treatment units lie within it. These units are: 143, 144, 145, 147, 148, 153, 154, 164, 171, 172, 222, 223, 245, and 251.

The second unroaded area is just west of Lava Cast Forest. It includes approximately half of the only Old Growth management area in the planning area. It also includes all of units 162, 163 and 242.

The third area is located near Sugar Pine Butte. Similar to the Lava Cast Forest area that ONRC identified, a large portion of this area consists of lava flows and outbreaks. It encompasses all of units 123 and 139 and portions of 106, 137 and 259.

As discussed below in the Recreation section, lava flows in the planning area allow for exploration and some over-the-snow use in high snow years.

EFFECTS

Alternative 1 - No Action

Inventoried Roadless and Unroaded Areas
There would be no direct effects on the Inventoried Roadless Areas or unroaded areas (as identified by ONRC) from the No Action alternative. No activities would take place that would have any effect on the roadless character of the North Paulina Roadless Area.

Past timber harvest and woodcutting activities within the Lava Cast planning area have created landscape textures and patterns that are evident from view points along parallel roads to the identified unroaded areas. From viewpoints along these roads, it is obvious to the casual observer that the area has been modified by human activity.

All ongoing and reasonably foreseeable future actions are located outside of the North Paulina Inventoried Roadless Area.

Therefore the ongoing and future actions would have no effect on soil, water, air, diversity of plant and animal communities, landscapes, or cultural properties that are present in the North Paulina IRA.

Alternatives 2 & 3

Inventoried Roadless

No treatments are proposed within Inventoried Roadless Areas.

Alternative 2 and 3 treatments would have no effect on roadless area characteristics in the North Paulina IRA. All but one proposed treatment (unit 34) and the Roadless Area are geographically separated by approximately ¼ mile, which would block sites and sounds associated with proposed treatments.

Alternatives 2 and 3 treatments would have no effect on soil, water, diversity of plant or animal communities, landscapes, or cultural properties that are present in the North Paulina IRA. Proposed treatments are ¼ mile or farther from the boundary of the North Paulina IRA. Treatments could have a short-term impact on the feeling of solitude that may be experienced by recreationists in the North Paulina Roadless Area. Proposed harvest treatments would be evidenced primarily by the sounds of harvest operations and the sight of smoke rising from landing piles being burned. There could be a short-term impact on air quality if smoke from pile burning drifts into the Roadless Area. Changes in vegetation resulting from proposed actions would not be discernable from vista points within the IRA.

Unroaded Areas

All proposed units overlap areas that have been previously harvested. Temporary roads used in the past to access these areas were closed following harvest activities. With the exception of units that are adjacent to Road 9720 (units: 45, 82, 83, 85, and 158) and Highway 97 proposed treatment units (units: 55, 57, 58, 62, 63, 64, 66 209, 369, 70-78, 80 and 269) are within the General Forest management area allocation (GFO). Units adjacent to the roadways identified above are within the Scenic Views. Partial Retention applies to those units adjacent to Road 9720, while Retention applies to those units along Highway 97 (see Table 33). Temporary roads would be primarily within proposed treatment units. They would be located on pre-existing, unclassified road prisms. Temporary roads would be closed following treatments. There would be no permanent road construction in the unroaded areas.

Alternative 2 and 3 treatments would not affect areas with undisturbed soils. Treatments would occur in areas with past harvest activities. Detrimental soil conditions presently exist (see discussion in Soils effects section). The proposed overstory treatments would not affect the existing diversity of plant and animal communities within the unroaded areas. Past treatments have opened up the forest canopy. Proposed treatments would not change the class of dispersed recreation present within the unroaded areas (Roaded Natural and Roaded Modified). Harvest treatments would be evidenced by the sites and sounds of harvest operations, skid trails, landings, temporary roads, stumps, and damaged understory trees.

The areas identified by ONRC as having roadless characteristics are areas where there are no system roads. Two of the areas are predominately lava flows and this characteristic is

maintained in the project since there are no treatments on the open lava flows. Other forested areas identified are without system roads though they do not have roadless character as described previously. These areas were harvested during the railroad logging era and have evidence of logging, such as logging grades, stumps and cable throughout the area.

Table 3-34: Proposed vegetative treatments within unroaded areas.

Unroaded Area/ Treatment Unit Number	Management Allocation	Alternatives 2 & 3 Proposed Treatment	Acres	Temporary Road
Area 1				
Unit 143	GFO	Thin from below (HTH)	91	0.3 miles
Unit 144	GFO	Thin from below (HTH)	54	0.2 miles
Unit 145	SV	Thin from below (HTH)	22	0.1 miles
Unit 147	GFO	Thin from below (HTH)	27	0.1 miles
Unit 148	Transition Zone NNVM	Thin from below (HTH)	55	0.2 miles
Unit 153	GFO	Thin from below (HTH)	45	0.2 miles
Unit 154	Transition Zone NNVM	Thin from below (HTH)	36	0.1 miles
Unit 164	GFO	Thin from below (HTH)	66	0.2 miles
Unit 171	GFO	Thin from below (HTH)	154	0.5 miles
Unit 172	GFO	Thin from below (HTH)	36	0.1 miles
Unit 222	GFO	Thin from below (HTH)	36	0.1 miles
Unit 223	GFO	Thin from below (HTH)	4	0.0 miles
Unit 245	SV	Thin from below (HTH)	57	0.2 miles
Unit 251	GFO	Thin from below (HTH)	75	0.3 miles
Area 2				
Unit 162	GFO	Thin from below (HTH)	198	0.7 miles
Unit 163	GFO	Thin from below (HTH)	33	0.1 miles
Unit 242	GFO	Thin from below (HTH)	164	0.5 miles
Area 3				
Unit 123	GFO	Thin from below (HTH)	79	0.3 miles
Unit 139	GFO	Thin from below (HTH)	39	0.1miles
Unit 106 (portion)	GFO	Thin from below (HTH)	82	0.3 miles
Unit 137 (portion)	GFO	Thin from below (HTH)	53	0.2 miles
Unit 259 (portion)	GFO	Thin from below (HTH)	7	0.0 miles

RECREATION

Scope of the Analysis

Existing conditions for both developed and dispersed recreation resources were considered for this analysis.

Affected Environment and Existing Conditions

There are significant acres of lava flows, which host little recreation, other than dispersed exploration and some over the snow use in high snow years.

There is significant use from specific areas, such as Oregon Water Wonderland, known as Tract C in the Bend Pine Nursery Land Conveyance Act. This includes all modes of transportation for dispersed use. Newberry Estates is another source of user trails, which may access this area from the southwest.

Developed Recreation
Developed recreation sites within the planning area include the trailheads for Hoffman Island trail and Lava Cast Forest trail. Hoffman Island trailhead is informal with 2 vehicle spaces and Lava Cast Forest trailhead is a formal trailhead with parking designated for 10 vehicles.

Dispersed Recreation
Dispersed recreation sites activities include; dispersed campsites, driving for pleasure (4-wheeling included), OHV use, shooting, and forest products collection. Vandalism and dumping are also problems in this area due to its proximity to urban settings. Many of these activities occur within this zone. There are an estimated 30-40 dispersed campsites in the planning area. These are mostly hunting related and receive little use, except during hunting season. A significant part of the area is lava flow which is relatively inaccessible and divides the area.

Trails
There are two official trails in this area, Hoffman Island, .7 miles long, and Lava Cast Forest, .9 miles long. Lava Cast Forest and Hoffman Island are accessed via the 9720 road (approximately 9 miles).

Off Highway Vehicle (OHV) use in this area has been present for approximately the past twenty years and continues to increase over time. There has been a marked increase in OHV use in the past 2-3 years. In this general area, there has been approximately 140 miles of user trails and user created roads have been inventoried (2004). There are numerous trails as well as hill climbs that have developed over time. Resource damage in the form of eroded soils continues and increases with precipitation, especially during thunderstorm rains. The area topography and terrain makes it easy for motorized use to increase. The planning area is adjacent to and contains part of Newberry National Volcanic Monument, where all OHV use is prohibited during the summer months.

There are numerous roads and trails adjacent to the urban area on the Forest used as hiking, jogging, biking, horseback riding and OHV routes.

EFFECTS

Recreation

Alternative 1 - No Action

The No Action alternative would not create any new recreation opportunities, and would see recreation facilities in general, be operated and maintained as they currently are. Standards and guidelines from the Deschutes LRMP, as well as professional judgment were used to guide the analysis.

Developed Recreation
There would be no changes to existing developed facilities in any alternative.

There would be an increased risk of loss of facilities at the Lava Cast trailhead to fire by not treating dense vegetation and fuels adjacent to these facilities. There would also be a loss of opportunity to manage adjacent stands for the purpose of opening up views from these sites of other vistas. There would also be an opportunity lost to interpret various cutting regimes for the purpose of education. In addition, public health and safety could suffer in case of a catastrophic event.

Dispersed Recreation
The No Action alternative would not change dispersed recreation opportunities or physical features on the ground.

Existing dispersed campsites would continue to be utilized at an increasing rate. These campsites are generally hunting camps used mostly in the fall. The result of overuse, such as trampling and loss of vegetation, and increased barren core area would increase to unacceptable levels if not managed.

Day use activities would continue to increase, especially closer to the urban interface zone on the west. Illegal practices typical of activities in this zone, such as garbage and refuse dumping, shooting and others would be on the increase.

The increasing use of the area by motorized recreationists, summer and winter, would continue the development of user-created OHV trails in the planning area.

People driving on the Forest would continue to increase as the need for motorized access with an aging population increases. User created roads would be used and created.

Trails
User trails would continue to develop. As the population and use grows over time, there is a need for people to get away from the developed, high use areas and as a result explore surrounding on foot, bike, motorized vehicles, etc. As this happens, common and logical routes are used repeatedly and a trail develops. These trails are in general a combination of the easiest and shortest routes from one place to another. These places are usually destinations such as a viewpoint, or hill climb area. Users also may use system or non-system roads to recreate on.

The No Action alternative would not change any of the user created routes. They would continue to be used increasingly as more people discover them. They would not be signed. Any impacts occurring from them on other resources would continue. More trails and roads would be created over time.

Recreation use would continue to rise at a consistent rate; approximately 5% per year. This is due to a similar increase in the population of Central Oregon as well as an ever-growing

popularity of the area and its recreation and other amenities. However, use is would likely not increase to that level within the project area due to lack of recreation opportunities and facilities.

Alternatives 2 & 3

Developed Recreation
The two developed trailhead areas have had vegetation and fuels treated in past actions. The proposed treatments would assist in further protecting these areas and facilities

Dispersed Recreation
Dispersed recreation in the area would not directly be affected by vegetative treatments except for short term interruptions due to on the ground actions.

There may be some disturbance to dispersed campsites where they exist on the ground due to vegetation removal activities. Where possible, the dispersed campsites would be avoided and/or rehabilitated if compromised.

Dispersed travel on forest roads, including 4-wheeling is an increasing activity. This would be interrupted during vegetation removal activities, but not long term. The proposed road closures would have a long term impact to this use. However, due to the amount of trails that exist, versus the amount of road closures, there would not be a large net loss for this activity.

Trails
Proposed activities would not affect the two system trails in the area.

SCENIC RESOURCES

Scope of the Analysis

The analysis shall focus on a balance between ecological (natural interests and values) and cultural (human interests and values). The Ecosystem Management process integrated, incorporated, and provided the foundation for planning and appropriate action for managing scenery within the analysis area. The essence of Ecosystem Management framework deals with the following basic questions:

1. What do we really value? What do we want in landscape value and character?
2. How did the existing natural system component evolve? What's sustainable?
3. What do we currently have? What is the existing condition and integrity?
4. How do we move conditions from what we have now to what we desire?

The USDA Forest Service established a Handbook for Scenery Management System (SMS--USDA FS 1995) to protect and enhance scenic resources which may be diminished by human activities, such as vegetation management, recreation and/or administrative facility development. The Scenery Management System (SMS) is used in conjunction with the Deschutes National Forest Land and Resource Management Plan (LRMP 1990). The analysis

takes into consideration the balance between Social (human) and Ecological (natural) needs within the project area.

The Forest Service implementing regulations, currently establish a variety of Scenic Quality Standards (SQO's for Scenic Views--MA-9). These standards include:

- Natural Appearing Landscape with High Scenic Integrity Level (formerly Retention, MA-9, SV-1),

- Slightly Altered Landscape with Medium Scenic Integrity Level (formerly Partial Retention, MA-9, SV-2),

- Altered Landscape with Low Scenic Integrity Level (formerly Modification or General Forest, MA-8, GFO) within the Foreground as well as in the Middleground landscape.

Scenic integrity for Lava Cast Vegetation Management planning area would be natural appearing character where various line, form, color, and texture elements can be found within the landscape. Human alterations, in general, would be subordinate and conform to natural appearing landscape characteristics. Character trees, snags, unique rock forms, and small openings, to highlight special features within the landscape, are desirable and encouraged. Where biologically feasible, diversity in vegetation species, age and size classes would be encouraged (Deschutes NF LRMP MA-9).

Affected Environment and Existing Conditions

In general, the planning area may seem at first glance a “natural appearing landscape” to the causal forest visitors. However, the current condition is far from being natural. Decades of historic timber harvest and fire suppression have led to a condition of mostly a high density forest landscape. The area consist mostly second growth, black bark ponderosa pine stands of various age and size classes in the lower elevation. Although rare, there are occasional old-yellow bark trees that exist along the travel corridors, such as Highway 97 and Forest Road 9720. Mixed conifer forest dominates the higher elevation sites.

The depth-of-field view deep into the forest is restricted to mostly the immediate foreground area due to the current high level of vegetation density.

EFFECTS

Scenic Resources

The proposed activities assume vegetative management that upon implementation would create an altered and different forest character that is expected to be healthier, enhance long-term scenery and improve the overall recreational experience.

The effect on scenic resources from the proposed actions, specifically on landscape character, scenic quality, and scenic integrity level, can be classified into two specific categories. The first is short-term effects (within landscape term of 0-5 years), and the other is long-term effect

(from 5 years and beyond). The effect from the proposed management activities would be most evident to the visiting public within the foreground landscape (0-1/2 mile corridor) and some part of the Middleground landscape (1/2 to 5 miles).

The unit of measure for the environmental effects, specifically on scenic resources from the proposed management activities, can be categorized into two distinctive areas. They are: 1) Acres (or percentage) of improved or enhanced scenery; and 2) Acres (or percentage) of impacted on short-term scenic quality within the Foreground and Middleground landscape, as viewed from a travel corridor or a viewpoint, following implementation. This effects analysis is taking into consideration both short- and long-term affects.

Alternative 1 - No Action

There would be no change to scenic resources from any proposed actions. Natural conditions and effects would continue to occur (as described in the Silviculture and Fuels Effects sections). Scenic resources would be affected by any future natural events, such as wildfire or insects and disease outbreaks.

The area's landscape character, scenic quality, and scenic integrity level would remain essentially the same during the short-term period. The long-term scenic quality, scenic integrity level, and landscape character are expected to be altered through time as vegetation aging processes naturally alter the planning area's scenery.

Under this alternative, the Deschutes National Forest LRMP directions, the Desired Future Condition for Scenic Views (LRMP MA-9 S & G's as listed and described earlier under Section 4) is not expected to meet as originally intended.

Alternative 2 – Proposed Action

This alternative would move the area's landscape character closer toward the Desired Future Condition for Management Area 9 (MA-9), Scenic Views, under the Deschutes National Forest LRMP, while specifically addressing the other issues such as fuels reduction, wildlife habitat management, soil productivity, and forest health.

Scenic and travel corridors are expected to be affected by the proposed treatment units under this alternative. The following proposed treatment units would have a direct effect on scenic resources and travel corridors: 48, 50-64, 66-86, 158, 196-198, 209, 214, 245, 369, 380, and 382.

The majority of the proposed management activities would occur in area primarily within part of General Forest (MA-8) and Scenic Views allocation areas (MA-9, SV1 and SV2). Vegetation and fuels would be treated within the proposed treatment units that fall within the foreground Scenic Views landscape areas and corridors. Such treatment activities are expected to alter existing forest character, help improve forest health, and also enhance long-term (5 years and beyond) scenic quality. This would meet the Desired Future Condition (LRMP M9-15, M9-34, M9-64). However, short-term (0-5 years) scenic quality, scenic integrity level, and

landscape character is expected to be altered by the proposed management activities (treatments) and practices.

The existing landscape character, scenic quality and integrity level would be altered from the existing densely stocked forests to a more opened and thinned out forests within the proposed treatment units 13, 48, 50-64, 66-86, 158, 196-198, 209, 214, 245, 369, 380, and 382.

With the help of effective implementation practices, including the protection and retention of residual green trees, post treatment activities within allocated timeframes, effective implementation of recommended mitigation measures, and on site monitoring the following end results are expected:

- The short-term (within landscape term of 0 to 5 years period) effect(s) is expected to alter exisiting landscape character, scenic quality and scenic integrity level from a densely stocked forest to a more open forest that offer “filtered” views deep into the foreground landscape. Such short-term effect(s) may appear to be a dramatic alteration (to the existing conditions), to both local residents and casual visitors, until such time as the healing of affected area began. Since the proposed treatment areas are within good growing sites, this process is expected to take between one or two growing seasons for groundcover components to take effect and help heal the disturbed landscape as result of the proposed management activities.
- The long-term (within landscape term of 5 years and beyond) effect(s) is expected to be of considerable enhancement and beneficial to landscape character, scenic quality and scenic integrity level as the proposed thinning of forest is expected to improve forest health, increase tree growth rate, and enhance large tree components in the landscape. Additionally, the various fuels treatment activities, such as mowing and under burning of forest floor, are expected to increase the ground cover components, which add more value to the scenic quality, landscape character, and scenic integrity level within the foreground landscape.
- The "Filtered” views deep into the foreground landscape, including toward rock outcropping and distance buttes, are expected to be opened up more by the proposed management activities. The existing landscape character, scenic integrity level, and scenic quality is expected to be altered and enhanced as result.
- The desired "open park-like stands" would be created, through thinning of small trees and mowing and/or under burning of groundcover, to show case large-yellow bark Ponderosa pine and/or other large tree species, for area along scenic travel corridors.
- The "sequential scenic experience" is expected to enhance a visitor's experience along travel corridors, such as Highway 97, 40, 42, and Forest Road 9720, following treatment.
- The residual stumps, slashes and debris, following treatment activities, are expected to be minimal and blend well with existing environment. It would not be highly noticesible or visible to the “casual visitors” after treatment activities are completed.
- Prescribed burn scars, mowing, and other fuels treatment activities could be evidenced under this alternative. The effect(s) of underburning on scenic views can be effectively mitigated to reduce short-term impact on scenery.

Under this alternative, the Deschutes National Forest LRMP directions, the Desired Future Condition for Scenic Views (LRMP MA-9 S & G's) is expected to move closer toward the desired conditions as specified.

Alternative 3

This alternative would more rapidly move the area's landscape character much closer toward the Desired Future Condition for Management Area 9 (MA-9), Scenic Views, under the Deschutes National Forest LRMP directions.

The following proposed treatment units would have a direct effect on scenic resources and travel corridors: 50-64, 66, 69-83, 85-86.

The effect of this alternative on landscape character, scenic quality, and scenic integrity level is comparable in scale and scope to Alternative 2. However, due to the strong emphasis on variable density treatment (thinning), which closely aligns with natural stand density patterns, the end result is expected to meet the desired natural appearing landscape character.

Under this alternative, the Deschutes National Forest LRMP directions, the Desired Future Condition for Scenic Views (LRMP MA-9 S & G's as listed and described earlier under Section 4) is expected to meet as specified.

Along with the impacts of past actions and events, cumulative effects also address reasonably foreseeable actions.

Central Oregon has always been a very dynamic landscape characterized as always evolving. Whether this evolution is by way of natural or man-made process, they all have cumulative and altering effects on landscape character, scenic quality, and scenic integrity level at a varying degree. Individually and cumulatively, these man made and natural processes have created a landscape characterized as "distinctive" or "unique" (in accordance with the USDA Forest Service Manual 2380, Landscape Management). These man made and natural disturbances have, in effect, deviated from the previous "natural appearing" character of Central Oregon's characteristic landscape.

Over the past decade, countless projects on the Deschutes National Forest have been planned and designed to help make this fire, insect and disease prone forest area more resilient. As a result, the cumulative effect on scenery can be classified as altering the landscape from a densely stocked forest character to a more open park-like stand of healthy green trees. Many of the past, present, and future planning projects are all expected to contribute toward a more desired forest conditions that meet both short and long-term scenic views (for more detail, consult the list of projects found in the Bend/Fort Rock RD, Deschutes National Forest, 2005 Geographic Planning Areas).

ECONOMIC AND SOCIAL

Scope of Analysis

The following summarizes the economic analysis completed for the Lava Cast project and can be found in the project file.

Forest Service Handbooks 1909.17 and 2409.18 direct the evaluation of Economic Efficiency for proposed projects. To assess economic efficiency of Alternatives 2 and 3, the anticipated timber volumes and costs were entered into TEA.ECON, a spreadsheet developed by the Forest Service to assess economic efficiency. The analysis can be used to compare alternatives, not to give an absolute number for the outputs. Numbers useful for comparing alternatives include a benefit/cost ratio, discounted benefits, discounted costs, and present net value. Effects on the local economy include estimated number of jobs created or maintained.

This analysis does not place a value on indirect benefits which may occur (such as increased future yields resulting from reduced stocking). Other amenity values, such as dispersed recreation or wildlife habitat, also were not included in the analysis. Table 3-34 summarizes this analysis.

EFFECTS

Economic and Social

Alternative 1

With this alternative, no commercial forest products would be provided to the economy. There would be no net sale value, and no additional jobs would be created or maintained. There would be no benefits to the local economy.

Although Alternative 1 would generate no current revenues to returns, there is a cost resulting from the expenditure of planning monies. The present net value would be a negative $405,000. Since there are no revenues predicted it is not possible to calculate a benefit/cost ratio.

Alternatives 2 and 3

Factors contributing to differences in the benefit/cost ratio and the present net value for Alternatives 2 and 3 are: 1) the amount of fiber/saw timber proposed for removal, 2) sale preparation costs, and 3) cost of soil restoration and associated noxious weed monitoring, road closure and decommissioning and precommercial thinning. The Present Net Value is the value of costs present benefits minus present costs. Benefits and costs in the future are discounted to equate to values today using 4% as the discount rate. Included in the analysis is an estimate of the value of the logs. This value is affected by the logging cost and hauling costs. For example, if fuel prices rise, the price paid for timber would likely decrease. The present net value is positive. However, with the fuels treatments the overall present net value is negative. Alternative 2 would provide approximately 5% more commercial forest products than Alternative 3.

Although the past decade has seen a significant reduction in employment within the lumber and wood products industry, the industry is still an important contributor to the local economies. In 1999 in Crook County 1,510 people were employed in the lumber and wood products industry and in Deschutes county 4,770 people[5].

Over the last 10 years, an annual average of approximately 68.2 MMBF of timber has been sold from the Deschutes National Forest. In the near future, the amount of timber offered for sale is expected to be near this annual average. The Deschutes National Forest is expected to continue offering timber for sale and is expected to continue making contributions to the local economy as a result of timber harvest activities. Timber proposed for harvest with Alternatives 2 and 3 would be approximately 38 to 40% of the Forest's annual average timber sale program. This is expected to be sold in more than one year.

[5] Oregon Employment Department; US Bureau of Labor Statistics.

Table 3-35: Summary of economic efficiency analysis.

Economic Measure	Alternative 1 (No Action)	Alternative 2	Alternative 3
Benefits			
Acres of Commercial Harvest	0	9,512 acres	9,279 acres
Volume (Total) Million Board Feet (MMBF) Hundred Cubic Feet (CCF)	 0 0	 27.5 MMBF 52,834 CCF	 26.3 MMBF 50,598 CCF
Discounted Benefits[1]	0	***$1,686,632***	***$1,612,706***
Costs			
Environmental Analysis	$405,000	$405,000	$405,000
Sale Preparation	----	$8.00/ccf	$8.75/ccf
Sale Administration	----	$5.36/ccf	$5.36/ccf
Subsoiling	----	$34,105	$32,305
Noxious Weed Monitoring	----	$8,257	$7,797
Road Decommission	----	$1,375	$1,375
Road Closure	----	$2,200	$3,600
Pre-commercial thinning	----	$435,960	$448,650
Discounted Timber Sale and KV Costs		***$1,518,565***	***$1,496,938***
MST	----	$451,682	$451,388
Hand piling	----	$237,096	$384,948
Grapple piling	----	$24,672	$24,672
underburn	----	$820,650	$781,800
Discounted Natural Fuels Costs		***$1,208,784***	***$1,292,427***
Total Discounted Costs[1]	***$405,000***	***$2,727,349***	***$2,789,365***
Summary			
Benefit/Cost Ratio[1] without fuels treatments		1.11	1.08
Benefit/Cost Ratio[1] with fuels treatments	----	0.62	0.58
Present Net Value[1] without fuels treatment		$168,067	$115,767
Present Net Value[1]	-$405,000	-$1,040,717	-$1,176,660
Jobs maintained or created[2]	0	264	252
Estimated Employee Income[3]	0	$8,398,104	$8,016,372

[1] Assumes 4% discount rate.

[2] Calculated using figures for the Deschutes National Forest from Appendix B-5 of the FY 1997 Timber Sale Program Annual Report. Excluding firewood from the volume harvested on the Deschutes National Forest, an estimated 9.6 jobs per million board feet were maintained or created.

[3] Derived by multiplying (a) the number of jobs maintained or created by (b) $31,811, the average 1999 salary in Central Oregon for lumber and wood products jobs. Source of salary information: Oregon Covered Employment & Payrolls by County and Industry, Oregon Employment Department, and US Bureau of Labor Statistics.

MANAGEMENT CONSISTENCY

This project was analyzed as to consistency with management plans and direction including the Deschutes Land and Resource Management plan, Eastside screens (amends the forest plan) and the Newberry National Volcanic Monument Management plan.

Consistency with Deschutes LRMP

The project is consistent with the standards and guides listed in Appendix B. The proposed treatments are a proactive response to meet standards in regards to insects and disease, and reducing fire risk. Forest health is improved through thinning. Thinning from below and favoring ponderosa pine leaves the healthiest, longest lived trees on the site.

Forest-wide (FF-1 to FF-11) standards and guidelines give direction on wildfire prevention and suppression. Both alternatives focuses on the prevention of human caused wildfires in and near high use and high risk (FF-1) recreation areas, roads, and beetle killed stands adjacent to private lands by closing roads and the strategic placement of EA units to reduce fire risk. Consistent with LRMP FF-9, burning plans and silvicultural prescriptions are prepared in advance for all prescribed burning in order to ensure compliance with the Oregon Smoke Management Plan and LRMP. In addition to air quality monitoring of prescribed burns by the Oregon Department of Environmental Quality, Forest Service personnel are routinely posted as lookouts on burn days to track smoke plumes and suspend burning operations to ensure strict compliance with the CAA and to minimize smoke intrusions into designated areas and Class 1 Airsheds.

No snags are planned to be removed under any alternative. There would be no measurable direct impacts to snags levels. Snag levels are below directed levels; however no intentional reduction in snag habitat would occur with the implementation of any alternative.

Existing levels may be below those proposed by current direction in the lodgepole pine and mixed conifer habitat types in some areas, but meeting or exceeding directed levels in other area inside and outside of proposed units. It appears that the planning area is meeting directed levels in the ponderosa pine habitat type. Mitigation measures are proposed to help ensure that directed levels are met within proposed units.

It is expected that the target ratios of hiding cover and forage would be maintained across the landscape. Mitigation measures in black-bark ponderosa pine stands are proposed, meeting the intention of WL-59.

Active goshawk nests that are found before or during management activities would be protected from disturbance during the nesting season (March 1 – August 31) as required by Forest Plan WL-3 (see Mitigation #5). Although the old goshawk nest within the project area has not been known to be active since 1987, its stand would be protected during the nesting season.

Based on the assumption that 400 acres provide a nest core and post-fledging area, and that foraging habitat is not limiting, there would be habitat to provide for 15 pairs of goshawks after

completion of either of the proposed alternatives. Using other research estimates of home range size, there would be a net decrease of 1 (1-4 pairs total from 2-5 pairs under No Action) pair of goshawks as a result of the action alternatives. All known goshawk nest sites and potential nesting habitat would be retained under both alternatives. Current Screens direction, WL-7 and WL-9 are met; WL-6 is likely met.

All alternatives comply with current direction for Cooper's and Sharp-Shinned hawks. Potential nesting habitat would remain within the project area, and potential habitat is not considered limiting on the forest. The action alternatives would create more nesting habitat in the long-term. Any new nests discovered would be protected from disturbance (see Mitigation Measures).

All alternatives comply with current direction for Osprey. Potential habitat was analyzed for effects, and mitigation measures are proposed to protect any active nests from disturbance.

In order to enhance conformance with the LRMP standard and guidelines, roads would need be closed. The action alternatives as proposed with mitigation measures move the planning area closer to the threshold level than the no action alternative.

Under the action alternatives, equipment operations would cause some new soil disturbances in portions of previously managed areas where ground-based logging is proposed for this entry. As previously discussed under direct and indirect effects, the project design elements, management requirements, and Best Management Practices (BMPs) built into this alternative are all designed to avoid or minimize potentially adverse impacts to the soil resource. The amount of disturbed soil associated with temporary roads and logging facilities would be limited to the minimum necessary to achieve management objectives. Compliance with LRMP standard and guideline SL-5 is addressed by excluding small portions of activity areas with sensitive soils on steep slopes (greater than 30 percent). None of the proposed activity areas overlap landtypes that contain soils with a high erosion hazards or potentially wet soils with seasonally high water tables that would require special mitigation.

All reasonable Best Management Practices for Timber Management and Road Systems would be applied to protect the soil surface and control erosion on and adjacent to roads and logging facilities that would be used during project implementation. These conservation practices are to be implemented during and following project activities to meet the stated objectives for protecting and maintaining soil productivity.

Soil restoration treatments would be applied to rectify impacts by reducing the amount of detrimentally compacted soil dedicated to existing roads, temporary roads, and some of the primary logging facilities within specific activity areas. Restoration treatments, such as subsoiling, are designed to promote maintenance or enhancement of soil quality. These conservation practices comply with LRMP interpretations of Forest-wide standards and guidelines SL-3 and SL-4. Subsoiling mitigation is also supported by the Forest Service Manual and Regional direction for planning and implementing management activities (FSM 2520, R-6 Supplement No. 2500-98-1).

A few activity areas (14 EA units in Alternative 2 and 13 EA units in Alternative 3) would still have detrimental soil conditions that exceed the 20 percent standard. However, there are no violations of Regional policy (FSM 2520, R-6 Supplement) or LRMP Standards and Guidelines SL-3 and SL-4 because the project would not cause an activity area to move from a detrimental soil condition less than 20 percent to one that is greater than 20 percent; nor would the project increase detrimental soil conditions in activity areas that currently exceed 20 percent of the unit area.

Under all alternatives, the combined effects of all past, present, and reasonably foreseeable management activities would be within allowable limits set by Regional direction and LRMP standards and guidelines for protecting and maintaining soil productivity within each of the proposed activity areas.

Neither action alternative is expected to create any impacts that would cause irreversible damage to soil productivity. There is low risk for mechanical disturbances to cause soil mass failures (landslides) due to the inherent stability of dominant landtypes and the lack of seasonally wet soils on steep slopes. Careful planning and the application of Best Management Practices and project design elements would be used to prevent irreversible losses of the soil resource.

The development and use of temporary roads and logging facilities is considered an irretrievable loss of soil productivity until their functions have been served and disturbed sites are returned back to a productive capacity. Both action alternatives include soil restoration activities (subsoiling) that would improve the hydrologic function and productivity on detrimentally disturbed soils. There would be no irretrievable losses of soil productivity associated with restoration treatments that decommission unneeded roads and management facilities.

Consistency with Eastside Screens

The Eastside Screens amend the Deschutes LRMP. The Lava Cast project area is low in late old structure (LOS) when compared to HRV. Commercial harvest in LOS stands is not allowed within areas covered by the Eastside Screens. Alternative 2 would require a Forest Plan Amendment for commercial thinning in LOS stands. Alternative 3, which avoid commercial harvest in LOS stands, would be consistent with the Eastside screens and would not require a Forest Plan amendment.

Eastside screens promote the development of open, park-like stands where possible. It is also desired to grow large diameter old trees. Thinning from below promotes growth of larger diameter trees and reduces the chance of mortality in all size class trees from insects and wildland fire. There is no decrease in stands with large diameter trees. The stands treated are composed of one cohort age group with the possibility of some scattered older large diameter trees left following the logging in the 1920s and 1930s. The multi-strata are made up of trees of various sizes but of one age class. Opening stands and allowing a new age classes to develop would promote the two old growth structures which are in short supply.

Wildlife connectivity corridors have some management and harvest planned in them. Treatments in connectivity corridors are allowed as long as the treatments do not reduce stocking levels below the upper one-third of the site potential. The thinning planned in the Lava Cast project have target prescription basal areas to keep the stands in the upper one-third of the site potential.

Eastside Screens, #6 Interim wildlife standard, d. Scenario A, 3) "Maintain connectivity and reduce fragmentation of LOS stands by adhering to the following standards…(1) …a contiguous network pattern by at least 2 different directions…(2) canopy closures are within the top one-third of site potential. Stand widths should be at least 400 ft. wide. If stands meeting these descriptions are not available , leave the next best stands for connections…(4) Harvesting within connectivity corridors is permitted if all the criteria in (2) above can be met, and if some of understory…is left in patches or scattered to assist in supporting stand density and cover. Some understory removal, stocking control, or salvage may be possible activities, depending on the site."

Although there is proposed harvest within LOS stands, under Alternative 2, the prescription objectives would help ensure sustainability of the LOS conditions. The current LOS stands would still function as LOS habitat. The action alternatives do not propose to remove any trees $\geq$ 21 inches in diameter. The project does not propose to enter any designated old-growth areas (MA-15). The action alternatives are expected to move the proposed treatment areas towards the HRV for LOS stands by treating some of the LOS either commercially (Alternative 2) or non-commercially (Alternative 3).

Deschutes LRMP direction refers to Deschutes DWTL for GTR numbers. This document gives figures based on Thomas 1979. In Bull et al (1997) it is suggested that Thomas figures were not high enough to cover all habitat needs. Using Screens direction to use most recent research, the GTR figures given in the DWTL were recalculated to reflect the updated 100% potential population levels based on newer research.

Rose et al (2002) and Mellen et al (2006) determined that the "potential population level" is a flawed technique. Mellen et al (2006) uses statistical "tolerance levels" in the DecAID tool. DecAID is not part of the Screens direction; therefore its use was for comparison purposes.

The Eastside Screens provides direction for goshawk habitat management on the Deschutes National Forest. In summary it states that all active and historic goshawk nest would be protected from disturbance, with a 30 acre no harvest buffer around the nest tree and designation of a 400 acre post-fledging area that would retain LOS stands and enhance younger stands to become LOS (Interim wildlife standard Scenario A, (5) Goshawks, a-c pages 12-13). A historic nest site is defined as one that has had nesting activity within the prior 5 years of the date of the Screens (1994/1995, page 13). Based on this definition, two of the three nest sites would be considered historical; the third one, the one within the project area, was last known active in 1987. This predates the screens definition for needing to establish a nest core and PFA. The other nest sites are outside the project area and far enough away from any proposed units such that there would be no disturbance to the nesting habitat.

Consistency with Newberry National Volcanic Monument Plan

The Newberry Monument Plan in some situations defers to the Deschutes Forest Plan, but it is not subject to it or the Eastside screens. Consistency in treating the ponderosa stands to favor open grown fire risk and stands which are managed with prescribed fire is an objective. Thinning with fuels treatments facilitates the open park like stands which are fire resistant and managed where natural processes, including prescribed fire, can be used to maintain the ecosystem. The Newberry management plan planned for after the first decade of the plan 135 acres per year of restoration of historic fire based ponderosa pine old-growth. Approximately 55 acres a year of climatic ponderosa and lodgepole pine restoration in this decade. In the current decade that is 1,900 acres of treatment. The Lava Cast project plans on 152 acres of treatments in ponderosa pine. Treatment of 381 acres was planned in the monument in the previous decade. The above treatments are expected to be the only treatments planned for this decade with no planning areas within the monument in the next five years.

Thinning with fuels treatments would facilitate the open park-like stands which are fire resistant and managed where natural processes can be used to maintain the ecosystem. Treating ponderosa stands to favor open, park-like stands that would be managed with prescribed fire is an objective of the NNVM plan.

Consistency with the Invasive Plant Program Preventing and Managing Invasive Plants in the Pacific Northwest Region

On October 11, 2005, the Regional Forester for the Pacific Northwest Region (Region Six) signed a Record of Decision emphasizing early detection and rapid response to increase the effectiveness and reduce potential for detrimental impacts of invasive species. The management direction includes new standards for preventing the introduction, establishment, and spread of invasive plants which amended forest plans; including the Deschutes National Forest. Currently, the Deschutes and Ochoco National Forests are developing a sub-regional plan to incorporate the new information and standards to address invasive species on a local level. The Record of Decision is expected in 2007. The following demonstrates compliance with the new regional plan:

1. Prevention of invasive plant introduction, establishment and spread will be addressed in vegetation management plans and other land management assessments. ***Effects of the actions, including no action, on invasive species is disclosed in Chapter 3. Also, a risk assessment has been completed.***

2. Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands. This standard does not apply to initial attack of wildland fires, and other emergency situations where cleaning would delay response time. ***A Project design Feature for clean equipment has been incorporated into the design of all action alternatives.***

3. Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be

weed free by District or Forest weed specialists. ***The Deschutes National Forest is developing a plan to certify rock sources, which would be used for road maintenance on this project.***

Native Americans, Minority Groups, Women, and Civil Rights

There are no known direct, indirect, or cumulative effects on Native Americans, minority groups, women, or civil rights beyond effects disclosed in the Deschutes LRMP.

Environmental Justice

Executive Order 12898 on environmental justice requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects on minority and low-income populations. For all alternatives, there would be no disproportionately high or adverse effects to minority or disadvantaged groups qualifying under the environmental justice order identified.

Other Effects and Findings

No old growth stands, Wild and Scenic Rivers or parkland would be adversely affected by the proposed activities. No significant irreversible or irretrievable commitment of resources would occur under Alternative 2 (Proposed Action) or Alternative 3. There would be some negligible irretrievable losses of dust caused by mechanical operations.

The alternatives are consistent with the goals, objectives and direction contained in the Deschutes National Forest Land and Resource Management Plan and accompanying Final Environmental Impact Statement and Record of Decision dated August 27, 1990 as amended by the Regional Forester's Forest Plan Amendment #2 (6/95) and Inland Native Fish Strategy, and as provided by the provisions of 36 CFR 219.35 (f) (2005), which address Management Indicator Species.

None of the alternatives establishes a precedent for future actions, nor a decision in principle about a future consideration.

No significant adverse effects to public health or safety have been identified. Harvest activities would not expose the public to an elevated risk of injury.

The effects of implementation of the alternatives are well known, not highly controversial, and do not involve any unique or unknown risks. Effects meet or exceed state water and air quality standards.

Implementation of Alternative 1 (No Action), Alternative 2 (Proposed Action), or Alternative 3 would be consistent with relevant federal, state and local laws, regulations, and requirements designed for the protection of the environment including the Clean Air and Clean Water Act. None of the alternatives establish a precedent for future actions or a decision in principle about a future consideration.

CHAPTER 4

PREPARERS

PREPARERS

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Appendix A

Alternative Comparison Tables

Table A-1: Lava Cast Units, prescriptions and management areas.

EA UNIT	Unit Acres	LOS Acres	Alt 2 RX	Alt 3RX	Alt 3 Harvest Ac.	Harvest Type	Natural Fuels Treatment	Stand improvement	MA 1	MA 1 ac	MA 2	MA 2 ac	WUI	Temp Rds
17	12		8	18	12	HTH	None	SPC	8					
18	22		8	18	22	HTH	None	No_SPC	8					0.1
19	5		8	18	5	HTH	None	SPC	8					
20	17		8	18	17	HTH	None	No_SPC	8					
21	143		8	18	143	HTH	None	No_SPC	8					0.5
22	23		8	18	23	HTH	None	No_SPC	8					0.1
25	43		8	18	43	HTH	None	SPC	8					0.2
26	9		8	18	9	HTH	None	SPC	8					
28	61		8	18	61	HTH	MST	No_SPC	8					0.2
30	40		8	18	40	HTH	DWR_GP	SPC	8					
31	7		8	18	7	HTH	DWR_GP	SPC	8					
32	16		8	18	16	HTH	None	SPC	8					
45	59		2	19	59	HTH	None	SPC	8	34.5	9	24		0.2
53	14		3	13	14	HTH	MST_UB	SPC	9				wui	
54	165		3	13	165	HTH	MST_UB	No_SPC	9	160.1	8	5.2	wui	0.6
55	28		3	13	28	HTH	MST_UB	No_SPC	9					0.1
56	21		3	13	21	HTH	MST_UB	SPC	9					0.1
57	88		3	13	88	HTH	MST_UB	No_SPC	9					0.3
58	24		3	13	24	HTH	MST_UB	No_SPC	9				wui	0.1
59	17	6	3	13	11	HTH	MST_UB	No_SPC	9	16.2	8	1.2	wui	0.1
60	8	2	3	13	6	HTH	None	No_SPC	9				wui	
62	33		3	13	33	HTH	MST_UB	SPC	9					0.1
63	74	5	3	13	69	HTH	MST_UB	No_SPC	9	71.8	8	2.6	wui	0.2
64	18		3	13	18	HTH	MST_UB	No_SPC	9				wui	0.1
66	88	19	2	12	69	HTH	MST	SPC	9	72.7	8	15.7		0.3
69	28	23	2	nt	0	HTH	MST_HP	SPC	9	27.5	8	0.8		0.1
70	77	49	2	nt	0	HTH	MST	SPC	9	76.8	8	0.4		0.3
71	16		2	12	16	HTH	MST	No_SPC	9					0.1
72	67	55	2	nt	0	HTH	MST_HP	SPC	9				wui	0.2
73	39		2	12	39	HTH	MST_HP	No_SPC	9				wui	0.1
74	41		2	12	41	HTH	MST_HP	SPC	9	41.3			wui	0.1
75	111		2	12	111	HTH	MST	SPC	9					0.4
76	29		2	12	29	HTH	MST	No_SPC	9					0.1
77	8		2	19	8	HTH	MST	SPC	9					
78	7		1	1	7	HTH	MST	No_SPC	9					
79	57		2	19	57	HTH	MST_HP	SPC	9					0.2
80	19		2	12	19	HTH	MST	No_SPC	9					0.1
81	32		2	19	32	HTH	MST	No_SPC	9					0.1
82	136	5	3	12	131	HTH	MST_UB	No_SPC	9	134.3	8	1.8		0.5
83	50		3	12	50	HTH	MST_UB	SPC	9	47	8	2.8		0.2
85	149		8	12	149	HTH	UB	No_SPC	9	139.5	8	14.7		0.5
86	37		2	19	37	HTH	DWR_GP	SPC	9					0.1
106	82		2	12	82	HTH	MST_UB	No_SPC	8					0.3
107	81		2	12	81	HTH	MST_UB	SPC	8					0.3

EA UNIT	Unit Acres	LOS Acres	Alt 2 RX	Alt 3RX	Alt 3 Harvest Ac.	Harvest Type	Natural Fuels Treatment	Stand improvement	MA 1	MA 1 ac	MA 2	MA 2 ac	WUI	Temp Rds
108	64		2	12	64	HTH	MST_UB	SPC	8					0.2
109	178		2	12	178	HTH	MST_UB	SPC	8	175.4	15	2.3		0.6
111	60		2	12	60	HTH	MST_UB	No_SPC	8					0.2
112	42		2	12	42	HTH	MST_UB	No_SPC	8					0.1
113	28	17	2	nt	0	HTH	MST_UB	SPC	8					0.1
114	39		2	12	39	HTH	None	No_SPC	8					0.1
115	156	109	2	nt	0	HTH	MST_UB	No_SPC	8					0.5
117	79		8	18	79	HTH	None	No_SPC	8					0.3
118	157		2	12	157	HTH	MST_UB	No_SPC	8					0.5
119	46		2	12	46	HTH	UB	No_SPC	8					0.2
120	11		2	12	11	HTH	MST_UB	No_SPC	8					
121	14		2	12	14	HTH	None	SPC	8					
122	29		2	12	29	HTH	None	SPC	8					0.1
123	79		8	18	79	HTH	None	No_SPC	8					0.3
124	114	24	2	12	90	HTH	None	SPC	8					0.4
125	48		2	12	48	HTH	None	No_SPC	8					0.2
126	259		2	12	259	HTH	MST_UB	SPC	8					0.9
127	80		2	12	80	HTH	MST_UB	No_SPC	8					0.3
128	333		2	12	333	HTH	MST_UB	No_SPC	8					1.1
129	180		2	12	180	HTH	None	SPC	8					0.6
130	101		2	12	101	HTH	UB	No_SPC	8					0.3
131	42		2	12	42	HTH	UB	No_SPC	8					0.1
132	102	2	2	12	100	HTH	None	No_SPC	8					0.3
133	136		2	12	136	HTH	MST_UB	No_SPC	8					0.5
134	34		2	12	34	HTH	None	SPC	8					0.1
135	29		2	12	29	HTH	None	SPC	8					0.1
136	40		8	18	40	HTH	None	No_SPC	8					0.1
137	53		2	12	53	HTH	None	SPC	8					0.2
138	34		8	18	34	HTH	None	SPC	8					0.1
139	39		8	18	39	HTH	None	SPC	8					0.1
140	32		8	18	32	HTH	None	SPC	8					0.1
141	23		2	12	23	HTH	None	No_SPC	8					0.1
142	18		2	12	18	HTH	None	SPC	8					0.1
143	91		2	12	91	HTH	UB	SPC	8					0.3
144	54		2	19	54	HTH	DWR_GP	SPC	8					0.2
145	22		2	19	22	HTH	MST_UB	SPC	8	21.2	9	0.6		0.1
146	20	18	3	13	20	HTH	DWR_GP	SPC	TZ1 NNVM					0.1
147	27		8	18	27	HTH	MST_UB	SPC	8	26.3	9	0.9		0.1
148	55		3	13	55	HTH	DWR_GP	SPC	TZ1 NNVM					0.2
150	82		2	12	82	HTH	UB	No_SPC	8					0.3
151	32		2	12	32	HTH	UB	SPC	8					0.1
152	21		2	12	21	HTH	None	No_SPC	8					0.1
153	45		2	12	45	HTH	None	SPC	8					0.2
154	36		3	13	36	HTH	UB	SPC	TZ1 NNVM					0.1
155	10		3	13	10	HTH	UB	No_SPC	TZ1 NNVM					

EA UNIT	Unit Acres	LOS Acres	Alt 2 RX	Alt 3RX	Alt 3 Harvest Ac.	Harvest Type	Natural Fuels Treatment	Stand improvement	MA 1	MA 1 ac	MA 2	MA 2 ac	WUI	Temp Rds
156	58	14	2	12	44	HTH	DWR_GP	SPC	8	46.6	9	11.1		0.2
157	71		2	19	71	HTH	DWR_GP	SPC	8	67.4	9	3.3		0.2
158	33		2	12	33	HTH	UB	No_SPC	9	26.1	8	6.4		0.1
159	32		3	13	32	HTH	UB	SPC	TZ1 NNVM					0.1
160	65		2	19	65	HTH	None	SPC	8					0.2
161	81		2	12	81	HTH	DWR_GP	SPC	8					0.3
162	198		8	18	198	HTH	DWR_GP	SPC	8					0.7
163	33		2	19	33	HTH	MST_UB	SPC	8					0.1
164	66		2	12	66	HTH	None	No_SPC	8					0.2
166	75	75	8	nt	0	HTH	MST_UB	SPC	8					0.3
167	45		2	12	45	HTH	MST_UB	SPC	8					0.1
169	42		2	19	42	HTH	None	SPC	8					0.1
170	83		2	12	83	HTH	None	SPC	8					0.3
171	154		8	18	154	HTH	None	SPC	8					0.5
172	36		2	19	36	HTH	None	SPC	8					0.1
173	59	12	2	12	47	HTH	DWR_GP	SPC	8					0.2
174	149		2	12	149	HTH	MST_UB	No_SPC	8					0.5
176	76	12	2	12	64	HTH	DWR_GP	SPC	8					0.3
177	21		2	12	21	HTH	None	No_SPC	8	19.2	9	2		0.1
178	39	17	2	19	22	HTH	DWR_GP	SPC	8	22.5	9	16.5		0.1
180	35		2	12	35	HTH	DWR_GP	No_SPC	8					0.1
182	32		2	12	32	HTH	None	SPC	8					0.1
184	76		2	12	76	HTH	DWR_GP	SPC	8					0.3
185	15	5	2	12	10	HTH	None	No_SPC	8					0.1
187	14	12	2	nt	0	HTH	None	SPC	8					
191	132		2	19	132	HTH	MST_UB	SPC	8					0.4
192	29		2	19	29	HTH	DWR_GP	SPC	8					0.1
193	56		8	18	56	HTH	None	SPC	8					0.2
194	42		2	12	42	HTH	None	No_SPC	8					0.1
195	37		2	19	37	HTH	None	SPC	8					0.1
196	65	6	2	19	59	HTH	MST_HP	SPC	9				wui	0.2
197	57		2	19	57	HTH	MST_HP	SPC	9				wui	0.2
198	46		2	12	46	HTH	MST_HP	SPC	9				wui	0.2
201	68	4	2	19	64	HTH	MST_HP	No_SPC	8	67.9	9	0.3	wui	0.2
209	31	2	2	12	29	HTH	MST_UB	No_SPC	9	30.2	8	0.4	wui	0.1
214	32		8	18	32	HTH	MST_HP	SPC	9				wui	0.1
221	119	12	2	12	107	HTH	MST_UB	No_SPC	8	116	9	3	wui	0.4
222	36		2	12	36	HTH	UB	No_SPC	8					0.1
223	4		2	12	4	HTH	UB	No_SPC	8					
227	84		2	12	84	HTH	MST_UB	No_SPC	8					0.3
242	164		8	18	164	HTH	MST_UB	SPC	8					0.5
244	38		2	12	38	HTH	None	No_SPC	8					0.1
245	57		2	12	57	HTH	MST_UB	SPC	9					0.2
246	18		2	12	18	HTH	None	SPC	8	56.3	9	0.9		0.1
247	88	38	2	12	50	HTH	None	SPC	8	77.9	9	9.7		0.3
248	26		8	18	26	HTH	UB	SPC	8					0.1

EA UNIT	Unit Acres	LOS Acres	Alt 2 RX	Alt 3RX	Alt 3 Harvest Ac.	Harvest Type	Natural Fuels Treatment	Stand improvement	MA 1	MA 1 ac	MA 2	MA 2 ac	WUI	Temp Rds
249	106		2	12	106	HTH	UB	No_SPC	8					0.4
250	4		2	12	4	HTH	UB	SPC	8					
251	75		2	12	75	HTH	UB	No_SPC	8					0.3
252	90		2	12	90	HTH	MST_UB	No_SPC	8					0.3
253	139		2	12	139	HTH	UB	No_SPC	8					0.5
254	137	12	2	12	125	HTH	UB	SPC	8	111.7	9	25.5		0.5
256	9		2	12	9	HTH	MST_UB	No_SPC	8					
257	11	2	2	12	9	HTH	MST_UB	SPC	8					
259	7		2	12	7	HTH	None	No_SPC	8					
260	5		2	12	5	HTH	None	No_SPC	8					
261	77		2	12	77	HTH	None	No_SPC	8					0.3
262	38		2	12	38	HTH	None	No_SPC	8					0.1
263	33		2	12	33	HTH	None	No_SPC	8					0.1
264	28		2	12	28	HTH	None	No_SPC	8					0.1
265	8		2	12	8	HTH	None	No_SPC	8					
266	16		2	12	16	HTH	None	No_SPC	8					0.1
267	114	1	2	12	113	HTH	MST	SPC	8	103.3	9	10.6		0.4
269	34		8	18	34	HTH	MST_HP	No_SPC	8	31.8	9	2.12		0.1
270	22		2	12	22	HTH	MST_UB	No_SPC	8					0.1
271	23		2	12	23	HTH	DWR_GP	SPC	8					0.1
272	23		2	12	23	HTH	DWR_GP	No_SPC	8					0.1
273	21		2	19	21	HTH	None	SPC	8					0.1
274	13		2	19	13	HTH	None	SPC	8					
275	31		2	19	31	HTH	None	SPC	8					0.1
276	66		2	12	66	HTH	UB	No_SPC	8					0.2
277	59		2	12	59	HTH	UB	SPC	8					0.2
278	31		2	12	31	HTH	UB	No_SPC	8					0.1
279	112		1	1	112	HTH	UB	No_SPC	8					0.4
280	110		1	1	110	HTH	MST_UB	No_SPC	8					0.4
369	32		nt	12	32	HTH	MST_HP	SPC	9	31.4	8	0.9		0.1
380	100		nt	19	100	HTH	MST_HP	SPC	9				wui	0.3
382	57		nt	19	57	HTH	MST_HP	SPC	9				wui	0.2
385	239		nt	19	239	HTH	MST_HP	SPC	8	239.5				0.8

Table A-2: Comparison of Alternatives with Fire Management Criteria (Strategic Plan for FY 2004 thru 2008- Goal # 1).

	Alternative 1	Alternative 2	Alternative 3
Acres treated that are in Condition Classes 2 or 3 in fire regimes 1,2,3 outside the WUI, and consistent with the 10- yr Comprehensive Strategy Implementation Plan	0	5,423 acres	5,423 acres
Acres treated to reduce hazardous fuels with by-products utilized	Approx 800 acres (TSI Lava Cast CE)??	10,160 acres	10,160 acres
Acres treated in WUI	847	5607	5607
Number of acres brought into stewardship acres	0	0	0
Standard and Guides:			
Acres treated to fuel loadings of FM 8,9 and fire intensity reduced	847 (Lava Cast CE)	11,448	11,448

Table A-3: Summary[1] of Net Change in Detrimental Soil Conditions following Mechanical harvest and Soil Restoration (Subsoiling) Treatments.

Net Change in Detrimental Soil Conditions from Existing Condition	Alternative 2			Alternative 3		
	Detrimental Soil Conditions			Detrimental Soil Conditions		
	<=20%	>20%	Total	<=20%	>20%	Total
Existing Condition	119 units 367 acres	44 units 565 acres	163 units 932 acres	118 units 358 acres	42 units 529 acres	160 units 887 acres
Following Harvest	87 units 757 acres	76 units 1,199 acres	163 units 1,956 acres	86 units 760 acres	74 units 1,134 acres	160 units 1,894 acres
Post-Project Condition Following Subsoiling Mitigation	149 units 1,402 acres	14 units 195 acres	163 units 1,597 acres	147 units 1,382 acres	13 units 173 acres	160 units 1,555 acres

[1] Summarizes unit specific information found in Appendix A of the Soil Specialist Report. .

Appendix B

Forest Plan Management Area Descriptions

Special Interest

Unusual geological or biological sites and areas are preserved and managed for education, research, and to protect their unique character. The Special Interest area in the Lava Cast planning area is all located within the Newberry National Volcanic Monument. Legislation established the Monument in the fall of 1990, subsequent to implementation of the Deschutes National Forest Land and Resource Management Plan. The Newberry National Volcanic Monument Comprehensive Management Plan gives further direction to the Management objectives in this area.

Research

The goal for Research Natural Areas is to preserve examples of naturally occurring ecosystems in an unmodified condition for non-manipulative research and education. Research Natural Areas are managed to preserve the natural ecological succession.

General Forest

Management within General Forest has the goal to emphasize timber production while providing forage production, visual quality, wildlife habitat and recreational opportunities for public use and enjoyment. Objectives include converting unmanaged stands to managed stands. And stands utilizing the site growth potential achieved through stand treatments including controlling stocking levels; maintaining satisfactory growth rates; protecting stands form insects, disease, and damage. Fuel loadings will be treated to reduce the chances of fire starts and rates of spread to acceptable levels.

Scenic Areas

Scenic Area goal are to provide Forest visitors with high quality scenery that represents the natural character of Central Oregon

Old Growth Reserve

Old Growth management areas have the goal to provide naturally evolved old growth forest ecosystems for (1) habitat for plant and animal species associated with old growth forest ecosystems, (2) representations of landscape ecology, (3) public enjoyment of large, old-tree environments, and (4) the needs of the public from an aesthetic spiritual sense. Old growth areas will also contribute to the biodiversity of the Forest.

Newberry National Volcanic Monument

The Newberry Volcanic National Monument established through legislation in 1990 (Public Law 101-522) was analyzed and a management plan developed and signed in 1994. The Newberry National Volcanic Monument Comprehensive Management Plan guides all management and restoration activities within the monument. Five management zones were developed of which the Lava Cast Planning area occupies one the Transition Zone. It also includes the Transferal Corridor within the Transition Zone.

Monument management goals, which are applicable to the Lava Cast vegetation resource within the Planning area, are:

Ensure that the values and resources for which Newberry National Volcanic Monument was designated are protected, conserved, enhance and interpreted.

Sustain or restore ecosystems and ensure ecosystem resiliency within the Monument and Special Management Area, while providing for natural ecological succession of vegetation to the maximum extent practical.

Ensure that tree diseases, insect infestations, fire hazards, and fires within the Monument and Special Management Area do not seriously threaten resources outside the monument and special Management Area boundaries.

The Transition zone includes the Purpose to "Reintroduction of fire through prescribed burning and reestablishment of fire-based, historic ponderosa pine old growth will be a key focus in this zone." The Transition Zone is broken into planning areas and each has planning issues for the various resources. Planning areas 14, 15a and 15b are within the Lava Cast planning area. For vegetation the Planning issues include

Area 14 Vegetation" ….lodgepole has commonly encroached into ponderosa pine due to fire exclusion. Opportunities for old-growth ponderosa pine and prescribed fire…."

Area 15 a & b planning issues Vegetation"…some potential for old-growth"

Desired Future Condition

Management Direction from the Deschutes Forest Plan, National Forest Management Act and Forest Service Washington Office and Regional Office direction is to manage for all resources and restore ecosystems where possible and to manage trees and vegetation to benefit the future generations. Management direction for fuels recommends using prescribed fire to maintain and enhance timber and forage production and makes note that the broadest application of prescribed fire will occur in the ponderosa pine type. One of the goals of fuels management is to reduce the risk of conflagration fire. Within the general forest areas slash will be treated to reduce the chances of fire starts and rates of spread to acceptable levels.

Management Direction for the Newberry Volcanic National Monument is given in the Deschutes National Forest Plan and the Newberry Monument Act of congress and the Newberry National Volcanic Monument Comprehensive Management plan.

Table B-1: Related Standards and Guides to Lava Cast Proposed Action

S&G	Area of Concern	S&G Discussion
TM-7	Timber	Optimum stocking will be based on maximum production of cubic feet of timber. Minimum stocking will include the least intensive silviculture strategy.
TM-10	Timber	Prescriptions will include integrated pest management. Where conditions are such that unacceptable damage or reductions in tree growth can be predicted, protection measures may be warranted prior to the actual damage occurring.
TM-19	Timber	Uneven-aged management is applicable to mature and over-mature stands of mixed ponderosa pine and lodgepole pin within the ponderosa pin community types but only where silvicultural activities will result in stands dominated by ponderosa pine. Dominance in these community types is achieved when stocking by ponderosa pine can be maintained at or above 50 percent of the minimum stocking level established in the silvicultural prescription on 80 percent of the treated acres. As an objective, dominance by ponderosa pine should maintain the existing character of these stands as well ass meet the long term needs for species diversity.
TM-31	Timber	Within the Genera Forest emphasis area, timber marking guidelines should be developed which retain the best quality crop trees of the greatest vigor. First priority for leave trees is those with demonstrated characteristics of good vigor. Second priority is those trees with characteristics, which will produce high value products in the future…
TM-54	Timber	Species preference will be determined by, 1) economics, 2) long term health, 3) biological diversity.
TM-64	Timber	Species diversity is most important in stands of broad species diversity
TM-65	Timber	In the mixed conifer community types, management practices, which meet the objectives of long term, stand health and vigor should maintain stands, which provide the necessary species diversity for wildlife habitat needs.
FH-1	Forest Health	It is the responsibility of the resource manager to consider, document and mitigate, if possible the potential impact of forest pests, both on short and long term management objectives.
FH-3	Forest Health	Management strategies should emphasize prevention of pest problems rather than suppression activities.
M8-15	General Forest	Minimum standards for wildlife habitat will be the Forest-wide standards/guidelines. Higher levels of wildlife habitat will be pursued as long as they will not conflict with timber management objectives.

S&G	Area of Concern	S&G Discussion
M8-26	General Forest	Fuel treatments other than prescribed fire: the lowest cost option which meets the silvicultural, soil, water, and fire objectives should be selected
M8-27	General Forest	Slash will be treated to reduce the chances of fire starts and rates of spread to acceptable levels, but will not be cleared to the point that the forest floor is devoid of all slash and logs. Some slash and larger dead material will be left for ground cover for soil protection, microclimates for establishment of trees and small mammal habitat.
M9-4	Scenic Views	Ponderosa pine in Foreground Scenic Views MA areas will be managed to maintain or create a visual mosaic of numerous, large diameter, yellow-barked trees with stands of younger trees offering visual diversity and a sense of depth in landscapes viewed from travel routes, recreation use areas and other sensitive viewer locations.
M9-6	Scenic Views	Management emphasis will focus on leaving the largest diameter trees and the healthiest crowns and forms in every stand. Visual variety will be provided by leaving occasional gnarly, old, over-mature "character trees".
M9-8	Scenic Views	Timing of Cleanup Activities: In Retention areas, slash from a thinning or tree removal activity, or other visible results of management activities, will not be visible to the casual forest visitor one year after the work has been completed.
WL-11	Goshawk	"Disturbing" activities will vary site specifically. An evaluation of potential disturbance will be made prior to planned activities, should a nest be encountered.
WL-59	Blackbark Pine Management	Approximately 10 percent of treated stands will be in clumps that will provide visual screening throughout the area and meet the following conditions: A minimum of ½ acre in size, which have not been thinned or harvested for at least 20 years. Small clumps will be suitable in dense strands but larger clumps may be needed in more open stands Dispersed throughout the unit so that visual screening is provided by the clumps in combination with topographic features.
WL-72	Downed Wood	Fallen trees and other woody debris will be retained in sufficient quantity, distribution, and physical characteristics to provide habitat for viable populations of dependent wildlife species over time. An average of at least 3 cull logs per acre, plus 3 additional logs per acre in more advanced stages of decomposition will be retained after timber management activities.

S&G	Area of Concern	S&G Discussion
M-1	Monument	Land management activities should allow natural ecological succession of vegetation to continue to the maximum extent possible. Where natural succession is not practical, analysis of projects and activities should explain why it is necessary to intervene and how this intervention is consistent with the purposes and provisions of the monument legislation….
M-4	Monument	Measures for the protection of geologic features will be incorporated into project plans as needed for any activity, which could adversely affect the features…
M-7	Monument	Project planning shall include measures to protect and where desirable enhance soil productivity and to mitigate disturbance to the soil resource.
M-8	Monument Ponderosa Pine Type	Intent: Overall any project to alter existing vegetation should respond to one or more of the following needs: 1) Protect existing large old trees and provide for the perpetuation of the genetic heritage they represent. 2) reestablish conditions that allow natural ecological succession of vegetation to the maximum extent practical 5) reduce serious threats from insects, fire, or disease to resources outside the Monument
M-12	Monument	Integrated Insect /Disease Management: It is recognized that insects and disease play an important role in ecosystem function. However in some cases, the level of insect and disease activity or the location of such activity could preclude the accomplishment of important goals of the Monument legislation. Treatment to reduce or prevent insect of disease effects should be a result of integrated resource analysis that has identified quantifiable land management objectives…
M-15	Monument Ponderosa Pine types	Where practical in light of other resource objectives, reestablish "historic" ponderosa pine old growth on a substantial portion of the ponderosa pine sites. The intent is to create (overtime) fuel conditions that allow stands to be maintained and perpetuated solely with prescribed fire rather than through mechanical treatments.
M-46	Monument Transition Zone	Fuel accumulations should be allowed to develop within levels that are natural to the vegetation community in question. Where fuel accumulation exceeds natural levels (i.e. pre-European), prescribed fire or other fuel reduction means may be considered to reduce them to a level consistent with ecosystem restoration objectives.

Appendix C

Definitions and Abbreviations

Table C-1: Harvest Activity (HRVST) Abbreviations.

Harvest Activity	
HTH	Commercial thin

Table C-2: Timber Stand Improvement (TSI) Abbreviations.

Timber Stand Improvement	
No SPC	No Precommercial thin
SPC	Precommercial thin

Table C-3: Natural Fuel Treatment (NF_Trt) Abbreviations.

Natural Fuel Treatment	
GP	Upon post sale review grapple Pile onto skid trails where fuels are above S&G standards
DWR	Down dead wood removal
MST	Mechanical shrub treatment
MST/UB	Mechanical shrub treatment/Underburn
MST_HP	Mechanical shrub treatment/ Hand Pile
None	No natural fuels treatment planned
UB	Underburn

Appendix D

Estimates of Detrimental Soil Disturbance from Mechanical Harvest and Soil Restoration Treatments

Appendix D displays quantitative, unit-specific information that shows the predicted amounts of detrimental soil conditions before and after implementation of project activities proposed under both action alternatives. The detailed information in Appendix A is summarized in Table 3-1 of the Soil Specialist Report.

The acres and percentages of existing soil impacts are shown in Column 4. The cumulative increases in detrimental soil conditions following mechanical harvest are shown in Column 5. The net changes following soil mitigation (subsoiling treatments) are shown in Column 6. The subsoil acres are determined by multiplying the estimated percentage (after restoration) by the unit acres (Column 3) and subtracting this amount from the disturbed acres in Column 5. Surface area calculations of designated areas such as roads, main skid trails, and log landings determine how much area needs to be subsoiled within individual activity areas of known size.

Table D-1. Alternative 2: Estimates of Detrimental Soil Conditions following Mechanical Harvest and Soil Restoration Treatments by Activity Areas.

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
17	HTH	12	1.6	13 %	3.1	26 %	0.7	20 %
18	HTH	22	2.4	11 %	5.3	24 %	0.9	20 %
19	HTH	5	0.5	10 %	1.2	23 %	0.2	20 %
20	HTH	17	1.7	10 %	3.9	23 %	0.5	20 %
21	HTH	143	15.7	11 %	34.3	24 %	5.7	20 %
22	HTH	23	6.9	30 %	8.5	37 %	2.1	28 %
25	HTH	43	4.3	10 %	9.9	23 %	3.4	15 %
26	HTH	9	1.1	12 %	2.3	25 %	0.5	20 %
28	HTH	61	18.3	30 %	22.6	37 %	5.5	28 %
30	HTH	40	4.4	11 %	9.6	24 %	1.6	20 %
31	HTH	7	2.1	30 %	2.6	37 %	0.7	27 %
32	HTH	16	3.8	24 %	5.0	31 %	1.3	23 %
45	HTH	59	0.0	0 %	7.7	13 %	0.0	13 %
53	HTH	14	0.3	2 %	2.1	15 %	0.0	15 %
54	HTH	165	3.3	2 %	24.8	15 %	0.0	15 %
55	HTH	28	0.3	1 %	3.9	14 %	0.0	14 %
56	HTH	21	0.2	1 %	2.9	14 %	0.0	14 %
57	HTH	86	0.9	1 %	12.0	14 %	0.0	14 %
58	HTH	24	0.2	1 %	3.4	14 %	0.0	14 %
59	HTH	17	0.2	1 %	2.4	14 %	0.0	14 %
60	HTH	8	0.2	3 %	1.3	16 %	0.0	16 %
62	HTH	33	0.7	2 %	5.0	15 %	0.0	15 %
63	HTH	74	0.7	1 %	10.4	14 %	0.0	14 %
64	HTH	18	0.2	1 %	2.5	14 %	0.0	14 %
66	HTH	88	17.6	20 %	24.6	28 %	7.9	19 %
69	HTH	28	0.0	0 %	3.6	13 %	0.0	13 %
70	HTH	77	0.8	1 %	10.8	14 %	0.0	14 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
71	HTH	16	0.3	2 %	2.4	15 %	0.0	15 %
72	HTH	67	0.7	1 %	9.4	14 %	0.0	14 %
73	HTH	39	0.4	1 %	5.5	14 %	0.0	14 %
74	HTH	41	0.4	1 %	5.7	14 %	0.0	14 %
75	HTH	111	0.0	0 %	14.4	13 %	0.0	13 %
76	HTH	29	0.3	1 %	4.1	14 %	0.0	14 %
77	HTH	8	0.2	3 %	1.3	16 %	0.0	16 %
78	HTH	7	0.2	3 %	1.1	16 %	0.0	16 %
79	HTH	57	0.6	1 %	8.0	14 %	0.0	14 %
80	HTH	19	0.4	2 %	2.9	15 %	0.0	15 %
81	HTH	32	0.0	0 %	4.2	13 %	0.0	13 %
82	HTH	136	28.6	21 %	42.2	31 %	17.7	18 %
83	HTH	50	1.0	2 %	7.5	15 %	0.0	15 %
85	HTH	149	43.2	29 %	53.6	36 %	13.4	27 %
86	HTH	37	0.0	0 %	4.8	13 %	0.0	13 %
106	HTH	82	0.8	1 %	11.5	14 %	0.0	14 %
107	HTH	81	0.0	0 %	10.5	13 %	0.0	13 %
108	HTH	64	0.0	0 %	8.3	13 %	0.0	13 %
109	HTH	178	3.6	2 %	26.7	15 %	0.6	15 %
111	HTH	60	10.8	18 %	15.0	25 %	3.0	20 %
112	HTH	42	0.0	0 %	5.5	13 %	0.0	13 %
113	HTH	28	0.6	2 %	4.2	15 %	0.0	15 %
114	HTH	39	8.2	21 %	10.9	28 %	3.1	20 %
115	HTH	156	25.0	16 %	35.9	23 %	4.7	20 %
117	HTH	79	0.8	1 %	11.1	14 %	0.0	14 %
118	HTH	157	37.7	24 %	48.7	31 %	17.3	20 %
119	HTH	46	10.6	23 %	13.8	30 %	4.6	20 %
120	HTH	11	0.3	3 %	1.8	16 %	0.0	16 %
121	HTH	14	3.5	25 %	4.5	32 %	1.3	23 %
122	HTH	29	6.7	23 %	8.7	30 %	2.9	20 %
123	HTH	79	17.4	22 %	22.9	29 %	7.1	20 %
124	HTH	114	1.1	1 %	16.0	14 %	0.0	14 %
125	HTH	48	0.5	1 %	6.7	14 %	0.0	14 %
126	HTH	259	0.0	0 %	33.7	13 %	0.0	13 %
127	HTH	80	8.0	10 %	16.8	21 %	0.8	20 %
128	HTH	333	50.0	15 %	76.6	23 %	10.0	20 %
129	HTH	180	1.8	1 %	25.2	14 %	0.0	14 %
130	HTH	101	2.0	2 %	15.2	15 %	0.0	15 %
131	HTH	42	0.4	1 %	5.9	14 %	0.0	14 %
132	HTH	102	23.5	23 %	30.6	30 %	10.2	20 %
133	HTH	136	32.6	24 %	42.2	31 %	15.0	20 %
134	HTH	34	7.8	23 %	9.2	27 %	2.4	20 %
135	HTH	29	0.3	1 %	4.1	14 %	0.0	14 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
136	HTH	40	9.2	23 %	12.0	30 %	6.0	15 %
137	HTH	53	13.3	25 %	17.0	32 %	9.0	15 %
138	HTH	34	0.3	1 %	4.8	14 %	1.4	10 %
139	HTH	39	6.2	16 %	9.8	25 %	5.9	10 %
140	HTH	32	6.4	20 %	9.0	28 %	2.6	20 %
141	HTH	23	5.8	25 %	7.4	32 %	2.1	23 %
142	HTH	18	1.6	9 %	3.6	20 %	0.4	18 %
143	HTH	91	0.9	1 %	12.7	14 %	3.6	10 %
144	HTH	54	0.0	0 %	7.0	13 %	0.0	13 %
145	HTH	22	0.0	0 %	2.9	13 %	0.0	13 %
146	HTH	20	0.0	0 %	2.6	13 %	0.0	13 %
147	HTH	27	0.0	0 %	3.5	13 %	0.0	13 %
148	HTH	55	0.0	0 %	7.2	13 %	0.0	13 %
150	HTH	82	18.0	22 %	23.8	29 %	15.6	10 %
151	HTH	32	1.6	5 %	5.8	18 %	4.2	5 %
152	HTH	21	1.7	8 %	3.8	18 %	0.0	18 %
153	HTH	45	3.6	8 %	8.6	19 %	0.0	19 %
154	HTH	36	7.9	22 %	10.4	29 %	3.2	20 %
155	HTH	10	2.1	21 %	2.9	29 %	0.9	20 %
156	HTH	58	0.6	1 %	8.1	14 %	0.0	14 %
157	HTH	71	2.8	4 %	11.4	16 %	0.0	16 %
158	HTH	33	3.6	11 %	6.3	19 %	0.0	19 %
159	HTH	32	0.0	0 %	4.2	13 %	0.0	13 %
160	HTH	65	0.0	0 %	8.5	13 %	0.0	13 %
161	HTH	81	0.8	1 %	11.3	14 %	0.0	14 %
162	HTH	198	0.0	0 %	25.7	13 %	0.0	13 %
163	HTH	33	0.0	0 %	4.3	13 %	0.0	13 %
164	HTH	66	12.5	19 %	18.5	28 %	6.0	19 %
166	HTH	75	23.3	31 %	28.5	38 %	9.7	25 %
167	HTH	45	13.5	30 %	16.7	37 %	5.4	25 %
169	HTH	42	4.6	11 %	10.1	24 %	1.7	20 %
170	HTH	83	24.9	30 %	30.7	37 %	9.9	25 %
171	HTH	154	21.6	14 %	35.4	23 %	4.6	20 %
172	HTH	36	8.3	23 %	10.8	30 %	3.6	20 %
173	HTH	59	17.7	30 %	21.8	37 %	5.3	28 %
174	HTH	149	40.2	27 %	50.7	34 %	13.4	25 %
176	HTH	76	0.0	0 %	9.9	13 %	0.0	13 %
177	HTH	21	4.4	21 %	6.1	29 %	1.9	20 %
178	HTH	39	9.0	23 %	11.7	30 %	3.9	20 %
180	HTH	35	8.1	23 %	10.5	30 %	3.5	20 %
182	HTH	32	3.2	10 %	7.4	23 %	1.6	18 %
184	HTH	76	18.2	24 %	23.6	31 %	8.4	20 %
185	HTH	15	3.5	23 %	4.5	30 %	1.5	20 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
192	HTH	29	2.9	10 %	6.7	23 %	0.9	20 %
187	HTH	14	3.2	23 %	4.2	30 %	1.4	20 %
191	HTH	132	21.1	16 %	30.4	23 %	4.0	20 %
193	HTH	56	8.4	15 %	15.1	27 %	3.9	20 %
194	HTH	42	4.6	11 %	10.1	24 %	0.9	20 %
195	HTH	37	4.4	12 %	9.3	25 %	1.9	20 %
196	HTH	65	0.7	1 %	9.1	14 %	0.0	14 %
197	HTH	57	0.0	0 %	7.4	13 %	0.0	13 %
198	HTH	46	0.5	1 %	6.4	14 %	0.0	14 %
201	HTH	68	0.7	1 %	9.5	14 %	0.0	14 %
209	HTH	31	0.6	2 %	4.7	15 %	0.0	15 %
214	HTH	32	0.3	1 %	4.5	14 %	0.0	14 %
221	HTH	119	1.2	1 %	16.7	14 %	0.0	14 %
222	HTH	36	2.9	8 %	7.2	20 %	1.0	18 %
223	HTH	4	0.0	0 %	0.5	13 %	0.0	13 %
227	HTH	84	9.2	11 %	15.1	18 %	0.0	18 %
242	HTH	164	0.0	0 %	21.3	13 %	0.0	13 %
244	HTH	38	11.4	30 %	14.1	37 %	3.5	28 %
245	HTH	57	13.7	24 %	17.7	31 %	6.3	20 %
246	HTH	18	4.0	22 %	5.2	29 %	1.6	20 %
247	HTH	88	0.0	0 %	11.4	13 %	0.0	13 %
248	HTH	26	0.3	1 %	3.6	14 %	0.0	14 %
249	HTH	106	9.5	9 %	19.1	18 %	8.5	10 %
250	HTH	4	0.4	10 %	0.8	21 %	0.1	19 %
251	HTH	75	12.0	16 %	18.8	25 %	11.3	10 %
252	HTH	90	0.9	1 %	12.6	14 %	1.2	13 %
253	HTH	139	12.5	9 %	26.4	19 %	0.0	19 %
254	HTH	137	1.4	1 %	19.2	14 %	0.0	14 %
256	HTH	9	2.1	23 %	2.7	30 %	0.9	20 %
257	HTH	11	0.4	4 %	1.9	17 %	0.0	17 %
259	HTH	7	1.9	27 %	2.4	34 %	0.8	23 %
260	HTH	5	0.2	4 %	0.9	17 %	0.0	17 %
261	HTH	77	18.5	24 %	23.9	31 %	8.5	20 %
262	HTH	38	9.1	24 %	11.8	31 %	4.2	20 %
263	HTH	33	7.3	22 %	9.9	30 %	3.3	20 %
264	HTH	28	7.0	25 %	9.0	32 %	3.4	20 %
265	HTH	8	0.2	3 %	1.3	16 %	0.0	16 %
266	HTH	16	3.5	22 %	4.8	30 %	1.6	20 %
267	HTH	114	1.1	1 %	16.0	14 %	0.0	14 %
269	HTH	34	0.3	1 %	4.8	14 %	0.0	14 %
270	HTH	22	5.5	25 %	7.0	32 %	2.6	20 %
271	HTH	23	2.8	12 %	5.8	25 %	1.2	20 %
272	HTH	23	2.5	11 %	5.5	24 %	0.9	20 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
273	HTH	21	2.3	11 %	5.0	24 %	0.8	20 %
274	HTH	13	1.3	10 %	3.0	23 %	0.4	20 %
275	HTH	31	3.4	11 %	7.4	24 %	1.2	20 %
276	HTH	66	0.7	1 %	9.2	14 %	0.0	14 %
277	HTH	59	0.6	1 %	8.3	14 %	0.0	14 %
278	HTH	31	0.6	2 %	4.7	15 %	0.0	15 %
279	HTH	112	14.6	13 %	24.6	22 %	2.2	20 %
280	HTH	110	1.1	1 %	15.4	14 %	0.0	14 %

Table D-2. Alternative 3: Estimates of Detrimental Soil Conditions following Mechanical Harvest and Soil Restoration Treatments by Activity Areas.

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
17	HTH	12	1.6	13 %	3.1	26 %	0.7	20 %
18	HTH	22	2.4	11 %	5.3	24 %	0.9	20 %
19	HTH	5	0.5	10 %	1.2	23 %	0.2	20 %
20	HTH	17	1.7	10 %	3.9	23 %	0.5	20 %
21	HTH	143	15.7	11 %	34.3	24 %	5.7	20 %
22	HTH	23	6.9	30 %	8.5	37 %	2.1	28 %
25	HTH	43	4.3	10 %	9.9	23 %	3.4	15 %
26	HTH	9	1.1	12 %	2.3	25 %	0.5	20 %
28	HTH	61	18.3	30 %	22.6	37 %	5.5	28 %
30	HTH	40	4.4	11 %	9.6	24 %	1.6	20 %
31	HTH	7	2.1	30 %	2.6	37 %	0.7	27 %
32	HTH	16	3.8	24 %	5.0	31 %	1.3	23 %
45	HTH	59	0.0	0 %	7.7	13 %	0.0	13 %
53	HTH	14	0.3	2 %	2.1	15 %	0.0	15 %
54	HTH	165	3.3	2 %	24.8	15 %	0.0	15 %
55	HTH	28	0.3	1 %	3.9	14 %	0.0	14 %
56	HTH	21	0.2	1 %	2.9	14 %	0.0	14 %
57	HTH	86	0.9	1 %	12.0	14 %	0.0	14 %
58	HTH	24	0.2	1 %	3.4	14 %	0.0	14 %
59	HTH	11	0.1	1 %	1.5	14 %	0.0	14 %
60	HTH	6	0.2	3 %	1.0	16 %	0.0	16 %
62	HTH	33	0.7	2 %	5.0	15 %	0.0	15 %
63	HTH	69	0.7	1 %	9.7	14 %	0.0	14 %
71	HTH	16	0.3	2 %	2.4	15 %	0.0	15 %
73	HTH	39	0.4	1 %	5.5	14 %	0.0	14 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
74	HTH	41	0.4	1 %	5.7	14 %	0.0	14 %
75	HTH	111	0.0	0 %	14.4	13 %	0.0	13 %
76	HTH	29	0.3	1 %	4.1	14 %	0.0	14 %
77	HTH	8	0.2	3 %	1.3	16 %	0.0	16 %
64	HTH	18	0.2	1 %	2.5	14 %	0.0	14 %
66	HTH	69	13.8	20 %	19.3	28 %	6.2	19 %
78	HTH	7	0.2	3 %	1.1	16 %	0.0	16 %
79	HTH	57	0.6	1 %	8.0	14 %	0.0	14 %
80	HTH	19	0.4	2 %	2.9	15 %	0.0	15 %
81	HTH	32	0.0	0 %	4.2	13 %	0.0	13 %
82	HTH	131	27.5	21 %	40.6	31 %	17.0	18 %
83	HTH	50	1.0	2 %	7.5	15 %	0.0	15 %
85	HTH	149	43.2	29 %	53.6	36 %	13.4	27 %
86	HTH	37	0.0	0 %	4.8	13 %	0.0	13 %
106	HTH	82	0.8	1 %	11.5	14 %	0.0	14 %
107	HTH	81	0.0	0 %	10.5	13 %	0.0	13 %
108	HTH	64	0.0	0 %	8.3	13 %	0.0	13 %
109	HTH	178	3.6	2 %	26.7	15 %	0.6	15 %
111	HTH	60	10.8	18 %	15.0	25 %	3.0	20 %
112	HTH	42	0.0	0 %	5.5	13 %	0.0	13 %
114	HTH	39	8.2	21 %	10.9	28 %	3.1	20 %
117	HTH	79	0.8	1 %	11.1	14 %	0.0	14 %
118	HTH	157	37.7	24 %	48.7	31 %	17.3	20 %
119	HTH	46	10.6	23 %	13.8	30 %	4.6	20 %
120	HTH	11	0.3	3 %	1.8	16 %	0.0	16 %
121	HTH	14	3.5	25 %	4.5	32 %	1.3	23 %
122	HTH	29	6.7	23 %	8.7	30 %	2.9	20 %
123	HTH	79	17.4	22 %	22.9	29 %	7.1	20 %
124	HTH	90	0.9	1 %	12.6	14 %	0.0	14 %
125	HTH	48	0.5	1 %	6.7	14 %	0.0	14 %
126	HTH	259	0.0	0 %	33.7	13 %	0.0	13 %
127	HTH	80	8.0	10 %	16.8	21 %	0.8	20 %
128	HTH	333	50.0	15 %	76.6	23 %	10.0	20 %
129	HTH	180	1.8	1 %	25.2	14 %	0.0	14 %
130	HTH	101	2.0	2 %	15.2	15 %	0.0	15 %
131	HTH	42	0.4	1 %	5.9	14 %	0.0	14 %
132	HTH	100	23.0	23 %	30.0	30 %	10.0	20 %
133	HTH	136	32.6	24 %	42.2	31 %	15.0	20 %
134	HTH	34	7.8	23 %	9.2	27 %	2.4	20 %
135	HTH	29	0.3	1 %	4.1	14 %	0.0	14 %
136	HTH	40	9.2	23 %	12.0	30 %	6.0	15 %
138	HTH	34	0.3	1 %	4.8	14 %	1.4	10 %
139	HTH	39	6.2	16 %	9.8	25 %	5.9	10 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
140	HTH	32	6.4	20 %	9.0	28 %	2.6	20 %
141	HTH	23	5.8	25 %	7.4	32 %	2.1	23 %
142	HTH	18	1.6	9 %	3.6	20 %	0.4	18 %
137	HTH	53	13.3	25 %	17.0	32 %	9.0	15 %
143	HTH	91	0.9	1 %	12.7	14 %	3.6	10 %
144	HTH	54	0.0	0 %	7.0	13 %	0.0	13 %
145	HTH	22	0.0	0 %	2.9	13 %	0.0	13 %
146	HTH	20	0.0	0 %	2.6	13 %	0.0	13 %
147	HTH	27	0.0	0 %	3.5	13 %	0.0	13 %
148	HTH	55	0.0	0 %	7.2	13 %	0.0	13 %
150	HTH	82	18.0	22 %	23.8	29 %	15.6	10 %
151	HTH	32	1.6	5 %	5.8	18 %	4.2	5 %
152	HTH	21	1.7	8 %	3.8	18 %	0.0	18 %
153	HTH	45	3.6	8 %	8.6	19 %	0.0	19 %
154	HTH	36	7.9	22 %	10.4	29 %	3.2	20 %
155	HTH	10	2.1	21 %	2.9	29 %	0.9	20 %
156	HTH	44	0.4	1 %	6.2	14 %	0.0	14 %
157	HTH	71	2.8	4 %	11.4	16 %	0.0	16 %
158	HTH	33	3.6	11 %	6.3	19 %	0.0	19 %
159	HTH	32	0.0	0 %	4.2	13 %	0.0	13 %
160	HTH	65	0.0	0 %	8.5	13 %	0.0	13 %
161	HTH	81	0.8	1 %	11.3	14 %	0.0	14 %
162	HTH	198	0.0	0 %	25.7	13 %	0.0	13 %
163	HTH	33	0.0	0 %	4.3	13 %	0.0	13 %
164	HTH	66	12.5	19 %	18.5	28 %	6.0	19 %
167	HTH	45	13.5	30 %	16.7	37 %	5.4	25 %
169	HTH	42	4.6	11 %	10.1	24 %	1.7	20 %
170	HTH	83	24.9	30 %	30.7	37 %	9.9	25 %
171	HTH	154	21.6	14 %	35.4	23 %	4.6	20 %
172	HTH	36	8.3	23 %	10.8	30 %	3.6	20 %
173	HTH	47	14.1	30 %	17.4	37 %	4.2	28 %
174	HTH	149	40.2	27 %	50.7	34 %	13.4	25 %
176	HTH	64	0.0	0 %	8.3	13 %	0.0	13 %
177	HTH	21	4.4	21 %	6.1	29 %	1.9	20 %
178	HTH	22	5.1	23 %	6.6	30 %	2.2	20 %
180	HTH	35	8.1	23 %	10.5	30 %	3.5	20 %
182	HTH	32	3.2	10 %	7.4	23 %	1.6	18 %
184	HTH	76	18.2	24 %	23.6	31 %	8.4	20 %
185	HTH	10	2.3	23 %	3.0	30 %	1.0	20 %
191	HTH	132	21.1	16 %	30.4	23 %	4.0	20 %
192	HTH	29	2.9	10 %	6.7	23 %	0.9	20 %
193	HTH	56	8.4	15 %	15.1	27 %	3.9	20 %
194	HTH	42	4.6	11 %	10.1	24 %	0.9	20 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
195	HTH	37	4.4	12 %	9.3	25 %	1.9	20 %
196	HTH	59	0.6	1 %	8.3	14 %	0.0	14 %
197	HTH	57	0.0	0 %	7.4	13 %	0.0	13 %
198	HTH	46	0.5	1 %	6.4	14 %	0.0	14 %
201	HTH	64	0.6	1 %	9.0	14 %	0.0	14 %
209	HTH	29	0.6	2 %	4.4	15 %	0.0	15 %
214	HTH	32	0.3	1 %	4.5	14 %	0.0	14 %
221	HTH	107	1.1	1 %	15.0	14 %	0.0	14 %
222	HTH	36	2.9	8 %	7.2	20 %	1.0	18 %
223	HTH	4	0.0	0 %	0.5	13 %	0.0	13 %
227	HTH	84	9.2	11 %	15.1	18 %	0.0	18 %
242	HTH	164	0.0	0 %	21.3	13 %	0.0	13 %
244	HTH	38	11.4	30 %	14.1	37 %	3.5	28 %
245	HTH	57	13.7	24 %	17.7	31 %	6.3	20 %
246	HTH	18	4.0	22 %	5.2	29 %	1.6	20 %
247	HTH	50	0.0	0 %	6.5	13 %	0.0	13 %
248	HTH	26	0.3	1 %	3.6	14 %	0.0	14 %
249	HTH	106	9.5	9 %	19.1	18 %	8.5	10 %
250	HTH	4	0.4	10 %	0.8	21 %	0.1	19 %
251	HTH	75	12.0	16 %	18.8	25 %	11.3	10 %
252	HTH	90	0.9	1 %	12.6	14 %	1.2	13 %
253	HTH	139	12.5	9 %	26.4	19 %	0.0	19 %
254	HTH	125	1.3	1 %	17.5	14 %	0.0	14 %
256	HTH	9	2.1	23 %	2.7	30 %	0.9	20 %
257	HTH	9	0.4	4 %	1.5	17 %	0.0	17 %
259	HTH	7	1.9	27 %	2.4	34 %	0.8	23 %
260	HTH	5	0.2	4 %	0.9	17 %	0.0	17 %
261	HTH	77	18.5	24 %	23.9	31 %	8.5	20 %
262	HTH	38	9.1	24 %	11.8	31 %	4.2	20 %
263	HTH	33	7.3	22 %	9.9	30 %	3.3	20 %
264	HTH	28	7.0	25 %	9.0	32 %	3.4	20 %
265	HTH	8	0.2	3 %	1.3	16 %	0.0	16 %
266	HTH	16	3.5	22 %	4.8	30 %	1.6	20 %
267	HTH	113	1.1	1 %	15.8	14 %	0.0	14 %
269	HTH	34	0.3	1 %	4.8	14 %	0.0	14 %
270	HTH	22	5.5	25 %	7.0	32 %	2.6	20 %
271	HTH	23	2.8	12 %	5.8	25 %	1.2	20 %
272	HTH	23	2.5	11 %	5.5	24 %	0.9	20 %
273	HTH	21	2.3	11 %	5.0	24 %	0.8	20 %
274	HTH	13	1.3	10 %	3.0	23 %	0.4	20 %
275	HTH	31	3.4	11 %	7.4	24 %	1.2	20 %
276	HTH	66	0.7	1 %	9.2	14 %	0.0	14 %
277	HTH	59	0.6	1 %	8.3	14 %	0.0	14 %

EA Unit Number	Proposed Activity HOR, HCR, HFR = Regen. Cuts HTH = Thinnning	Unit	Existing Detrimental Soil Conditions		Estimated Detrimental Soil Conditions After Harvest		Estimated Detrimental Soil Conditions After Restoration	
		Acres	Acres	Percent of Unit	Acres	Percent of Unit	Subsoil Acres	Percent of Unit
278	HTH	31	0.6	2 %	4.7	15 %	0.0	15 %
279	HTH	112	14.6	13 %	24.6	22 %	2.2	20 %
280	HTH	110	1.1	1 %	15.4	14 %	0.0	14 %
369	HTH	32	0.3	1 %	4.5	14 %	0.0	14 %
380	HTH	100	15.0	15 %	22.0	22 %	2.0	20 %
382	HTH	57	0.6	1 %	8.0	14 %	0.0	14 %
385	HTH	239	7.2	3 %	38.2	16 %	0.0	16 %

Appendix E

Summary of Public Scoping Comments

Table E-1: Summary of initial Lava Cast public scoping comments, June 27 – July 17, 2004.

Jim Larsen Letter, Sunriver area (06/17/04)
Comment
Supports reducing wildfire hazards.
Supports ponderosa pine stand development.
Prioritize thinning and shrub treatments in Wildland-Urban Interface. Prioritize these treatments in areas specifically: Highway 97 and Huntington Road, including Vandervert Road area. These areas have high density of small diameter lodgepole pine. These roads are heavy commuter and recreational use roads. Great potential for human-caused fire.
Lisa Blanton, The PROWL project, Bend, Oregon (6/18/04)
Comment
EA should clearly define what is meant by "stable", "resilient", and "resistant to disturbance", and offer scientific proof.
Concerned about effects on diversity by conversion to single-story ponderosa pine stands. Your stated objectives will convert mixed conifer stands to ponderosa pine. How is this more ecological sound?
Project focuses on logging areas that are outside of the Wildland-Urban-Interface zone – too great a distance to be effective WUI fire resistant corridors.
FS should not attempt to make General Forest areas "fire-safe zones" – FS has no legal basis to reduce fire risk for "forest users".
Request scientific basis for determining severe infestations of mistletoe and bark beetle.
Requests fuel reduction to focus on thinning trees and brush (specifically 12" and under in diameter).
Requests completing small diameter thinning by hand. Implementing this technique lessens ground disturbance and creates more jobs.
Requests more prescribed fire activities.
Protect soils in areas that are close to, or exceed, DNF soil plan standards in areas where soil damage was done prior to implementation of current standards. Not acceptable to plan to exceed soil plan standards and attempt mitigation later, also not acceptable to cause further soil damage in areas where previous damage has been done prior to implementation of new standards.
Requests documentation providing evidence that stand replacing fires over 1,000 acres were part of the previous ecological cycle for the area.
Fuels section – how many acres will be treated to reduce fire risk to condition class 1?
Fuels section-define "low risk". Request FS to cite substantive scientific evidence that links "low risk" to the exact type of logging and other management activities that are proposed to "short and long-term lowered risk of fire".
Flashiest fuels are small trees and scrubs--not mature trees (both standing live trees and dead snags, and downed snags). Recommend not implementing common FS practices of targeting mature trees (defined as dbh 12-21"). No ecological basis to target the mature trees that fall into 12-21" category.
WUI-Define exactly "Forest resources, improvements, and investments".
WUI-Concerned FS lumping too many items with WUI-don't want overly broad use of WUI.
Request scientific data regarding bark beetle and what exact threats are posed to the area from these insects--demonstrate how areas are "imminently susceptible" to these insect infestations.
Demonstrate how creating changes in stand structure with logging and other management activities will be ecologically preferable to the likely changes resulting from bark beetle infestation.
Wildlife: Document specific ways that the area is currently lacking in a diversity of forbs, shrubs, and tree age classes that are necessary of healthy, long-term deer habitat. Provide documentation that supports the assertion that the planned activities are needed to provide an increase in this type of diversity.
Wildlife: Do not support planned habitat fragmentation-will affect lynx and wolverine.
10.5 miles of planned road closures is not enough. 157 miles of roads are left-too much. Road density decrease from 3.5 to 3.3 miles of roads per square mile is inadequate for many wildlife species. Further recommendations for additional road closures will be made.
Document all wildlife surveys that have been completed over the last two years for T&E species, Protected, Sensitive, Rare and Management Indicator species.
Requests that new surveys for all plant and animals species that belong to T&E species, Protected, Sensitive, Rare and Management Indicator species.

Jim Larsen Letter, Sunriver area (06/17/04)
Comment
Support closing roads near goshawk nesting areas, and leaving their habitat intact by maintaining higher levels of canopy closure.
Concerned scoping letter indicates a large-scale logging project that will target larger trees, while claiming to make the Forest more resilient and lower fire risks.
Define what is meant by "poor vigor".
FS appears to target all mature trees since they do not grow as fast as younger trees. Points out that it would make more sense to allow older trees to stay so there will be more snags and downed logs in the long run, if the FS is concerned (as stated) in vertical and horizontal diversity.
Requests/recommends no logging on lava---contain sensitive plants, recover slowly from logging, and cost more due to contract equipment damage on lava.
3. Joe Stutler, Deschutes County Board of Commissioners – Letter (July 15, 2004)
Comment
Supports a fuels strategy evolving around the WUI.
Supports the overall stated objectives.
Agree with the Purpose and Need for Action as stated.
Deschutes Co. Fuels and Vegetation Mgt agree with the five identified needs but suggest a different ranking: 1. Reduce fire hazard adjacent to WUI, and to Forest resources, improvements, and investments. 2. Reduce to risk of high-intensity, stand replacement wildland fires. 3 Treatment to reduce fire regime condition class to 1. Priority 4 & 5 as currently stated.
Base priority shift on public safety concerns on citizens who live adjacent to the WUI, and in objectives set out in the *Federal Wildland Policy and Program Reviews* of 1995 and 2001.
Support the stated objectives of Wildlife Habitat, Scenic Quality, and Road Access.
Tract C lands should be conveyed into private ownership. If Tract C isn't turned over to private ownership then these lands should be given the highest priority for fire treatment due to proximity to high-density WUI.
On lands west of Highway 97 and all other treatment areas located along the western boundary of the project area, these have the highest priority for treatment based on: Public safety concerns, proximity to WUI, and consistent with *Federal Wildland Policy and Program Reviews.*
4. Jim and Patricia Pease, telephone call and letter (June 18, 2004)
Comment
Concerned that Lava Cast area has no WUI at all—few if any homes are located east of Highway 97.
These folks live in River Forest Acres, one of the 13 neighborhoods that make up the Upper Deschutes River Natural Resource Coalition, and are located within five miles of the Lava Cast project.
Their community with many volunteer hours and assistance of David Blair has developed a Community Wildfire Protection Plan under the Healthy Forest Restoration Act. This plan has identified FS lands from Wickiup to Sunriver that in need of fuels reduction. Their community has coalition neighborhoods that are designated "high density extreme and high extreme", the two highest fire danger ratings by the Oregon Dept of Forestry. These areas are located just a few miles west of Highway 97 from the Lava Cast area.
Generally support any project that reduces the risk of wildfire, but the FS is URGED to redirect their efforts to address areas around neighborhoods that have been designated "high density extreme" and high extreme".
5. Wes and Joanne Perrin, letter (June 17, 2004)
Comment
FS resources better spent on Forest lands immediately adjacent to established residential areas such as River Forest Acres and Hahner Park (or any of the other 12 communities grouped along the upper Deschutes River corridor).
Why is Lava Cast designated as WUI?
Few, if any homes in the designated planning area, and nothing that is legitimately urban in nature.
Concerned that FS is waving a "red flag" in front of environmental groups when we propose cutting up to 21" diameter trees. Concerned about the evolving legal battle.
Please rethink and modify this plan to meet the needs of the residents living close to FS lands focusing on areas designated by the State of Oregon as "high extreme" and "high density extreme".
6. John Salzer, Sunriver Owners Association, letter (June 15, 2004)
Comment
Supports the natural fuels treatments for the Sunriver WUI.

Jim Larsen Letter, Sunriver area (06/17/04)
Comment
Encourage early treatment of all units east of Sunriver to Highway 97.
Treatment areas of highest concern are those along South Century Drive, one of two primary escape routes from Sunriver.
Recommend early treatment of Tract C lands prior to conveyance into private ownership. Future owners may not make the lands fire safe.
Encourage mechanical shrub treatment to reduce fuels adjacent to Sunriver and scenic roads leading into Sunriver.
Thinning activities along South Century Drive should be screened from public view as much as possible.
If underburning is used instead of mechanical treatment, request that this work be conducted to minimize smoke intrusion into Sunriver. In addition, please do not conduct this work during the time of year when tourist visitation is high.
7. Barney Duberon, telephone call dated June 23, 2004
Comment
Supports thinning 1/3 of Lava Cast project area, beautiful stands of pine.
Concerned about 21"dbh limit and residual mistletoe.
Supports project and thinks it's important to continue.
8. John Morgan, Ochoco Lumber Company, Letter (June 2, 2004)
Comment
Supports Lava Cast project-treatment of fuel conditions and improved Forest health greatly needed.
Support thinning treatments that would focus on reducing dwarf-mistletoe and other insect/disease infestations.
Support commercial thinning and pre-commercial thinning-thinning trees of all age and size classes is essential to reduce stand densities to desired levels.
Supports use of mechanical treatments on slash and prescribed fire.
Supports only closing roads that contribute to soil erosion.
Supports aggressive management that will reduce risk of catastrophic fires in and near WUI communities.
9. Dean Richardson, private citizen, letter (August 10, 2004)
Comment
Requests reduction in fire risks. Improve Forest health, consider wildlife habitat, and improve scenic qualities.
Supports need for action.
10. Fred Tanis, Juniper Group-Sierra Club, Letter (June 18, 2004)
Comment
Treatment of 14,050 acres or 39% of total planning area, 21MMBF, to be excessive and much larger than other DNF commercial harvest sales.
Project jeopardizes a functioning Forest ecosystem.
Project's proposed actions will not restore the forest ecosystem to a self-sustaining condition.
Concerned about the potential loss of wildlife habitat and high quality forest resources.
Regarding scenic treatment along Highway 97.
Opposes aggressive removal of trees to enhance scenic views and creation of park-like stands.
Supports removal of hazard trees that complies with ODOT highway corridor safety standards.
Specific recommendations: all treatments on units along Highway 97 address wildfire risk reduction, existing mistletoe infections, and mountain pine beetle infestation.
Supports removal of forest debris, removal of fire ladder material, and removal of trees with dbh of less than five inches, especially where young trees grow in clump, and where such actions will significantly reduce the risk of an intense wildfire.
Prescribed fire treatments and manual pre-treatments should be prioritized over mechanical treatments.
Mechanical treatments should be considered only where prescribed fire is too risky for an initial treatment.
Strongly opposes aggressive commercial harvest and thinning prescriptions calling for removal of trees under 21"dbh to desired stocking levels on 11,265 acres (231 units).
Since remaining trees with dbh larger than 21 inches are far less than 1% of the standing trees, this previously stated prescription removes the largest trees within each listed planning unit.
Many units identified for commercial harvest and thinning have been previously treated during the last cutting cycle.
Strongly recommend that the project be modified to eliminate treatment of units that have not fully recovered from the

Jim Larsen Letter, Sunriver area (06/17/04)
Comment
previous harvest.
Strongly recommend that the removal of trees on any of the 231 planning units identified for commercial harvest must provide for the long-term sustainability of forest health, wildlife habitat, clean water, and recreation values.
Retaining these larger trees sustain the vigor of ponderosa stands and will allow a greater number of larger trees to mature gradually to late and old structure (LOS) conditions.
Strongly recommend that no treatments be applied to existing LOS and Old Growth Management Areas (OGMA).
Fuel reduction efforts should be focused to protect these latter areas including stands of multi-storied ponderosa pine providing diverse habitat for numerous wildlife species.
11. Chandra LeGue, Oregon Natural Resources Council, Letter (June 2, 2004)
Comment
Roadless Area: Avoid N. Paulina Peak IRA, several other roadless areas of 1,000 acres or more in the project area that should be protected. .
A full EIS should be prepared for this project if it involves entry into an uninventoried roadless area.
Thinning: … ONRC supports thinning that enhances forest health. In particular, we support variable density thinning which allows young stands to develop into more complex and resilient forests. This means that thinning should be done in a way that creates ¼ to ½ acre gaps, dense patches, lightly thinned, moderately thinned and heavily thinned patches in every stand.
In older forests, we only support thinning if there is no road construction. In young stands in RHCAs, we support thinning activities that enhance the development of trees to shade streams and become sources of coarse woody debris….
Prescribed Fire: We support prescribed fire … must be carefully planned so as to minimize effects on wildlife, soil, site productivity, and large trees, down woody debris, and snags.
Fall burning should be considered because that is when nature would have done most of the burning.
The effects of spring burning on the life-cycles of plants and wildlife must be fully considered in the NEPA process.
Additional Comments - From http://www.onrc.org/scoping/: Summarized • Avoid commercial timber harvest, roads, and mining in late-seral forests. • Impacts on old-growth species should be discussed in detail in the EA/EIS. This should include an analysis of effects on such species as the goshawk, bats, Canada Lynx, woodpeckers, Pine Marten, California Wolverine, Great Gray Owl, Pygmy Nuthatch or Bald Eagle, and other special status species listed in applicable management plans. Special attention to snag habitat is needed. • Special status species surveys must be completed prior to developing NEPA alternatives and before the decision is determined. On-the –ground field reconnaissance surveys must be done and used to develop NEPA alternatives. • Project analysis should separately discuss Riparian Management Objectives (under PACFISH and INFISH) and how the proposed alternatives will impact these objectives. Any commercial harvest activities or road construction in key watersheds or municipal watersheds should be avoided in order to protect water quality.
NEPA Documentation: • A full range of action alternatives should be considered for this project. These alternatives should include a wildlife enhancement, restoration, old growth protection (minimum fragmentation) and non-motorized recreation. • ONRC also sent a scoping letter specific to lynx concerns dated January 11, 2000. We incorporate that letter here by reference. This letter is also available on the web at: http:/www.onrc.org/scoping/.
12. Karen Coulter, Blue Mountain Biodiversity Project, League of Wilderness Defenders Comments from standard check-off form (6/10/04)
Comment
Why isn't microclimate condition differences of the sale units and their implications discussed? These include elevation, slope aspect, proximity to drainages and streams, historic and current ratio of other mixed conifer species (Grand fir, Douglas fir, Western Larch, Engelmann's spruce, Lodgepole pine and riparian hardwoods) to Ponderosa pine, etc.
The best way to replace large structure and Single strata with large (SSWL) conditions lost to past logging is to not log more large structure (e.g. 15-21" dbh as well as 21"+ dbh) and let more trees attain large sizes for future replacement live old growth trees, old growth snags and large wood debris -- rather than degrading the habitat values of existing MSWL and MSWOL by decreasing the total number of mature and larger trees through logging.
What is your evidence (data sources, method, years) for determining fire intervals and current vs. historic fuel

Jim Larsen Letter, Sunriver area (06/17/04)
Comment
conditions? How much of this fuel and small tree accumulation is due to past logging? How much more fuel-loading and small tree accumulation will this project contribute.
How much of the assumed low fire frequency is due to ongoing fire suppression? When and under what condition will the Forest Service allow natural wildfires to burn in the future?
There should be no logging allowed in designated connectivity corridors; if the Forest wasn't over-logged already, you wouldn't be constantly seeking to abrogate the Forest Plan to find more areas to log.
Species on the brink of extirpation (arguably including Wolverine, Lynx, and possibly Pine Marten) can't wait 20 years or more for better connectivity. Exposure results in population decline due to shooting, trapping or predation from larger "edge"-adapted predators or competition with more open forest-adapted predators for prey.
Define what you mean by understory thinning. Understory thinning should not mean logging up to 21'dbh. A 12" dbh limit would keep it to true under-story thinning. Why are you planning for middlestory thinning when the Watershed Assessment calls for understory thinning?
Please define "commercial thinning" as you propose to use it. What % of removal would be in larger size classes? (e.g. 12-14" dbh, 15-18", 19-21"?) What is the current basal area range in each unit (and canopy closure range) and how much basal area (and approximately how much canopy closure) would be removed? We have found tat some "commercial thinning" marking is actually heavy removal – virtual clearcuts on some sales …
We are opposed to removal of most young Lodgepole pine from meadows due to potential use of these areas by snowshoe hare and Lynx since Lynx are a federally listed Threatened species and their habitat should be protected wherever they may roam.
We are opposed to prescribe burning of wildlife connectivity corridors because, as with logging, burning removes needed hiding cover and protection from edge-adapted competitors and predators and from human disturbance.
We support prescribed burning only in the fall due to the unnatural ecological impacts of spring burning (affecting fledgling birds, young animals in burrows, sensitive flowering plants before seeding, fine root hairs of pine, drying up moisture reserves in soil, duff and down wood needed for summer) and the use of existing fuel breaks rather than creating more. Burning near riparian areas should be confined to above separating roads to reduce sedimentation potential.
We support livestock exclusion after natural or prescribed fire for at least 3-5 years. Plant recovery and soil conditions should be monitored (and water quality, riparian conditions if applicable) and livestock removed again or the allotment canceled of standards are violated or lose to violation.
We request that more roads be decommissioned … and that additional little-used or extraneous roads be placed in long-term closure with permanent barriers or decommissioned. Roads well underway in revegetation … should not be re-opened or re-constructed.
What % of the project area and of sale unit acreage has detrimental soil impacts? Are there sale units that exceed Forest plan standards for soil impacts? Which ones and how Much?
We are opposed to sub-soiling that destroys soil horizons or brings to the surface sub-surface rocks.
Heavy commercial logging does not "enhance & protect the planning area" – fuels are most flammable at 3" or less dbh
Completely avoid cultural heritage sites and noxious weed locations w/ground-disturbing activities & heavy equipment
What is the "Tract C" project?
Even-aged plantations of single species are also more susceptible to insect attack but pure PP stands may be natural to much of this area.
Most density is probably from trees < 8" dbh. Shrubs play a natural ecological role and should not be removed or mowed across the landscape. Likewise the few mixed conifer stands should not have mature trees removed to increase PP dominance as it's mostly PP across most of the region along Hwy 97 S. of Bend already until you reach the LP stands.
No commercial logging in the NNVM –Monuments should be left natural.

Appendix F

Wildlife Comparison of Alternatives/Evaluation Criteria

Table F-1: Comparison of Alternatives/Evaluation Criteria.

Criteria	No Action Alternative	Alt. 2	Alt. 3	Desired Condition/Comments
Deer and Elk Habitat				
1. Hiding cover levels (% of planning area)	54%	34%	34%	30%
2. Open road density within planning area: (miles/square mile)	3.5	3.1	3.1	2.5 mi/sq. mile
LOS/OGMA and Connectivity				
1. # acres LOS proposed for treatment	0	558	98	98 acres under Alt 3 will only receive non-commercial treatments
2. # of proposed units and # acres located within a corridor	0	15 250 ac	13 201 ac	
3. # acres of variable thinning to maintain a multi-layered stand characteristic	0	0	2168	Prescription #'s 13 & 19 under Alt. 3
Dead Wood Habitat				
1. # acres treated that decrease recruitment	0	3425 332 LOS	3578 18 ac LOS	Units to receive commercial and non-commercial treatment, and fuels treatment
2. Current availability of snags > 10 inches dbh (snags/ac total over planning area)	0.98-3.8	0.98-3.8	0.98-3.8	Cannot predict the loss or gain of snags due to treatments
3. # acres of larger downed wood removal as part of fuels treatments	0	981	981	
MIS Cavity-nesting Species (in addition to Dead Wood and LOS criteria)				
1. # acres of lodgepole and mixed conifer stands treated to restore ponderosa pine dominance	0	1546	1614	MCD & LP unit ac within the range of historical ponderosa pine Treatments favor white-headed woodpecker and reduce habitat for black-backed woodpecker
2. # of acres of widely-spaced thinning (indirect effects to white-headed woodpecker habitat)		827	809	Acres treated that would retain fewer trees per acre Prescription #'s 3 and 13
Selected MIS Raptors (in addition to LOS and connectivity criteria)				
1. # of acres of potential habitat in the planning area altered				No Action figures based on existing condition
Red-tailed Hawk		9534	9515	# ac Commercial and non-commercial thinning that creates habitat
N. Goshawk		3332	2915	# acres current habitat treated
Cooper's and Sharp-shinned Hawk		6328-6582	6328-6495	# acres current habitat treated
Osprey		9534	9299	# acres treated to create large trees (commercial thin)

2. Estimated # of pairs potentially found in planning area Red-tail Hawk Goshawk Cooper's Hawk Sharp-shinned hawk Osprey	 2-5 5 3-4	 1-4 4 3-4	 1-4 4 3-4	
Bats				
1. # acres of LOS ponderosa pine developed	0	9534	9299	Ac of commercial thinning to develop large ponderosa pine
2. # ac of mowing that reduce prey habitat	0	6122	6122	
Landbirds ***(Criteria for black-backed and white-headed woodpecker, Williamson's sapsucker, pygmy nuthatch, and flammulated owl see Dead Wood Criteria; refer to LOS Criteria for brown creeper and hermit thrush)***				
1. Conservation strategies addressed: Ponderosa Pine (PP): #ac Rx burning in PP types # ac thinning (HTH & SPC) in PP # miles of roads closed Lodgepole pine (LP) old-growth: # ac LP LOS treated # ac of all LP treated Mixed Conifer (MCD): # ac Rx burning in MCD # ac HTH without SPC in MCD # miles of roads closed		 3272 3314 11 38 1718 877 650 11	 3088 3114 18 0 1810 802 650 18	 For future LP LOS HTH with SPC reduces the multi-layered canopy
Marten ***(in addition to Dead Wood , LOS and Connectivity criteria)***				
1. # ac of current and potential habitat thinned		307 all current	333 current habitat 450 potential and current	MCD and LP mid and late seral Alt 2 Prescription #s 1,8; Alt. 3 Prescription #s 1, 12, 13, 18
2. # acres of potential habitat within the planning area treated for dwarf mistletoe (DMT)		307	333	DMT is associated with marten denning
3. # ac of DWR-GP (grapple-piling) in current and potential marten habitat		141	141	Larger CWM is used for hunting and denning

Appendix G

Response to Public 30 Day Comment

Lava Cast Project EA
Comment Analysis Process and Response to Comments

Introduction

Notification of the Lava Cast Project Environmental Assessment document was sent to the public and appropriate local, state, federal and tribal authorities beginning the week of November 22, 2006. A required 30-day comment period (40 CFR Sec. 1506.10) was provided between November 22, 2006 and December 22, 2006. Individuals and agencies who received the document were invited to comment. Within the comment period, comments were received in the form of postal letters and email postings on the project website.

The Forest Service process for documenting, analyzing, and responding to pertinent public comments received in response to the Lava Cast Project Environmental Assessment is consistent with section 40 CFR 1503.4, Response to Comments, of the National Environmental Policy Act (NEPA) regulations. This Response to Comments appendix describes the pertinent comments received on the EA and provides the agency's response to those comments. The public comments received are located in the Lava Cast Project Environmental Assessment record, on file at the Bend/Fort Rock Ranger District, and are available for public review.

Comment Analysis Process

Public responses submitted regarding the Lava Cast Project Environmental Assessment have been documented and analyzed using a process called Content Analysis. This systematic method compiles, categorizes, and captures all of the public viewpoints and concerns submitted during the official comment period in response to the EA. Information from the letters and emails received are all included in this analysis. Content Analysis helps the USDA Forest Service clarify, adjust, or incorporate additional technical information in preparation of the Final Environmental Assessment.

Content analysts have read all public responses and identified separate comments relating to this project within them that relate to a particular concern, resource consideration, and/or requested management action. A content analyst categorized each comment by using a numerical categorization or "coding" structure specifically tailored to record project documents. Each relevant comment was coded and verified for accuracy and consistency. Next, each response's set of coded comments was inserted verbatim into the project content analysis database program. The interdisciplinary team resource specialists provided responses to these comments where appropriate, and the analysis team prepared a final content analysis summary report – addressing the specific resource and management considerations.

Every project-specific comment and suggestion has value, whether expressed by one respondent or many. All input was read and evaluated and the comment analysis team attempted to capture all relevant public concerns in the analysis process.

Two general and related principles guided analysts when coding comments. These principles – encompassing both the need to maintain context and the need to capture respondents' sentiments and reasoning – were crucial to capturing the full range of public concerns. The

specialists have made every attempt to classify comments in a way that fairly represent respondents' concerns, and that facilitated the planning team's efforts to respond to those concerns. This was accomplished, in part, through frequent interactions among analysts augmented by regular consistency checks.

Comment Response Process

Specialists used the database sorting capabilities to produce reports that were then reanalyzed to identify all of the respondents' concerns.

The interdisciplinary team reviewed the quotations, considered the substance of the concerns, evaluated whether they triggered a change in the environmental analysis, and drafted responses. For some concerns, they reviewed the original letters – and additional attachment documents (where applicable) – to ascertain the full context of the concern.

Responses were written to address these public concerns. In general, the agency responded in the following five basic ways to the public comments as prescribed in 40 CFR 1503.4.

1. Modifying alternatives.
2. Developing and analyzing alternatives not given serious consideration in the EA.
3. Supplementing, improving, or modifying the analysis that the EA documented.
4. Making factual corrections.
5. Explaining why the comments do not need further Forest Service response.

Demographics and Affiliation

Letter #	# of Comments	Respondent Name	Organization	City / ST
1	40	Doug Heiken	Oregon Wild	Eugene, OR
2	7	Glen Ardt	OR Dept. of Fish & Wildlife	Bend, OR
3	56	Fred Tanis	Juniper Group/Sierra Club	Bend, OR
3		Karen Coulter	LOWD/Blue Mts. Biodiversity	Fossil, OR
4	3	Scott Hartung	Sunriver Owners Association	Sunriver, OR
5	0	Asante Riverwind	Oregon Chapter Sierra Club	Sisters, OR

Public Comments and Responses

Comment: ***Remember diameter caps are a tool in the tool box, don't reject the tool out of hand. The public likes it a lot because it gives them assurances. It is OK to use different diameter caps for different species, lower limits for fire resistant species, higher limits for fire intolerant species. The exceptional circumstances in which diameter caps allegedly don't work, are more rare than the***

circumstances in which alternative techniques will lead to unintended consequences, including lack of public trust. (1 - 22)

Response: There is a diameter limit of 21" as set by the Eastside Screens. A general discussion of a 12 inch diameter cap is discussed in the "Alternatives Considered But Eliminated from Detailed Study" section of the EA (p. 47). In summary, a 12" diameter limit was not prescribed because it would not allow the reintroduction of fire into this fire-adapted ecosystem. Also, modeling a 12" diameter limit indicates that 21% of the stands would be above the Upper Management Zone (UMZ) making them susceptible to bark beetle infestation. Modeling also indicates 62% of the stands being well above the UMZ stocking level within the first decade following treatment. This type of treatment would result in a short-term fix that in just over a decade would require another treatment to thin stands.

However, further review and discussion about conserving more wildlife habitat has resulted in modifying Alternative 3 in the following ways:

- There will be no commercial treatment in 140 acres to protect pine marten habitat.
- Modify the silvicultural prescription in unit 159 so that no ponderosa pine over 16 inch diameter at breast height (dbh) would be cut and basal area (BA) of 80 sq. ft. would be retained.
- Retain a lower limit of 60 BA in all stands where the silvicultural prescription had recommended retention levels as low as 40 BA.
- Where average stand diameter is less than 12", do not cut ponderosa pine over 16"dbh.
- Where average stand diameter is equal to and greater than 12", do not cut ponderosa pine over 18"dbh.
- The diameter limit for cutting white fir will be 18", while for lodgepole pine it will remain the standard 21"dbh.

By making these modifications, habitat for wildlife that relies on larger trees will be conserved.

Comment: ***There is growing evidence that in order to be effective, mechanical treatments must be followed by prescribed fire. But the effects of such fires must also be carefully considered.*** (1 - 24)

Response: No response necessary.

Comment: ***Buffer streams from the effects of heavy equipment and loss of bank trees and trees that shade streams.*** (1 - 37)

Response: As referenced on pgs. 7 & 18 of the EA, there are no known perennial or intermittent streams within the project area. Furthermore, there are no treatments proposed within Riparian Habitat Conservation Areas (RHCAs) as defined in the Inland Native Fish Strategy (INFISH, 1995).

Comment: ***Unfortunately, the ecologically unsound logging proposal for the Lava Cast Project fails to evidence any meaningful potential for collaboration or any real awareness on the part of the agency regarding conservation issues or the FS purported desires to actualize collaborative potentials. It is readily clear, that unless significant changes are made in the agency's preferred alternative and flawed analysis for this proposed project, we are again headed on a legal collision***

course of appeal and litigation. Yet, there exists no imminent "emergency" to hastily implement this project. Additionally, the numerous legal and ecological issues arising from it indicate that the project may never be legally permitted to be implemented anyway (in whole or part). (3 - 2)

Comment: ***Our organizations [Juniper Group/League of Wilderness Defenders] reiterate our offer to work with the USFS to redesign this project to better uphold conservation goals and federal environmental policy laws. Hopefully the FS will recognize this opportunity to begin a new, ecologically responsible direction, and together we can cooperatively create a project that can help restore the Lava Cast project area.*** (3 - 55)

Response: The Bend-Fort Rock Ranger District provided the public the opportunity to comment on the Lava Cast project. As discussed on pgs. 19-20, various methods were used to inform and reach out to the public to improve the Lava Cast project. Notification was issued online, in mailings, in news media; various meetings and field trips were conducted in the office and field. A summary of these comments can be found on p. 20 and Appendix E of the EA. Alternative 3 was a direct result of public comments gathered during the planning of this project. Both action alternatives meet the standards and guidelines of current management direction.

Comment: ***At a minimum, a new EIS is necessary for this project. In the event the agency chooses to move forward with this project as currently designed, we will be left with no choice but to endeavor to oppose and modify the project, or stop it entirely as may need be, to meet the numerous concerns and issues [we have] expressed . . .*** (3 - 56)

Response: The Lava Cast project area lies predominantly on lands that were clearcut harvested in the early 20th Century and have naturally-regenerated into the "blackbark" ponderosa pine forests that we see today. These formerly privately-held forestlands were later brought into federal acquisition and are atypical of most federally-managed forestlands. These forestlands are uniformly flat or gently-sloping (0-10% gradients are typical). Soils are of coarse, recent volcanic parent material and provide rapid infiltration of water. There are no streams, riparian areas, seeps, springs or standing water.

These are highly-altered forests with much reduced environmental concerns, hence public controversy, due to the lost opportunities from the previous extensive impacts of the railroad logging era. Detailed environmental assessments for planned forest restoration actions within these forestlands on the ranger district over the past two decades on the Bend-Fort Rock Ranger District have exhaustively concluded, both individually and cumulatively, that no significant adverse environmental effects have occurred from the routine restoration actions of stand thinning, shrub mowing, prescribing returned fire intervals, subsoiling detrimentally compacted soils and obliterating roads (source: Project 1950 NEPA files for "blackbark" thinning program from 1988 to present). Existing project design criteria (PDC) to provide scarce plant and animal habitat, protect cultural resources, protect and improve soil productivity and promote forest vigor and resiliency have consistently eliminated adverse environmental impacts. Routine restorative management treatments on similar forestlands nearby instead have accelerated the recovery of these forestlands to pre-railroad logging era conditions (source: Central Oregon Intergovernmental Council {COIC} monitoring report for Katalo East, Dec. 2006 on file at BFR).

Comment: ***The Forest Service did not consider all reasonable alternatives. The two action alternatives are too similar. (Though alt 3 looks a little less impactful than alt 2.)*** (1 - 13)

Comment: ***NEPA requires that all reasonable alternatives should be rigorously explored and objectively evaluated.This section is described as the heart of the EA analysis and should "present***

the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public. The EA considers only a no action alternative along with two virtually identical alternatives, that is, Alternatives 2 (proposed action) and Alternative 3. Since these latter two alternatives are nearly identical they are insufficient for the purposes of NEPA. In this situation the Forest Service has failed to fulfill this NEPA requirement by only considering effectively two extremes of the available possibilities, commercial harvesting and a no action alternative. We recommend that the Forest Service consider a restoration-based alternative utilizing no commercial logging but allowing non-commercial thinning. Although the Forest Service is not required to consider every possible alternative, failure to consider viable alternatives violates NEPA's requirements. Also by failing to consider a restoration-based alternative the Forest Service has failed to provide the public with a clear basis for evaluation of the project. (3 - 4)

Response: The Bend-Fort Rock Ranger District considered five different alternatives, three of which were fully analyzed. Pages 46-48 of the EA discusses three other alternatives that were considered but not fully analyzed. In this section, it discussed the original proposed action alternative, an alternative that was suggested from public comments that would thin stands to a certain stand density index, and another alternative from public comments to thin only trees up to a certain diameter limit. In regards to the first, the original proposed action was later modified by removing certain portions of the proposal. The areas removed were analyzed in two categorical exclusion (CE) projects: the Lava Cast Timber Stand Improvement Project (to non-commercially thin to reduce stand density, mistletoe and shrub fuels on 804 acres) and the Lava Cast Fuels Reduction Project (mechanical treatment and prescribed burning on 2,193 acres, 847 of which are Wildland Urban Interface). The latter two suggestions for alternatives development were considered and analyzed until it was determined that they would not improve forest conditions to the point that it would meet the intent of the Purpose and Need for the project. Furthermore, though alternatives 2 & 3 may appear similar in comparison to the number of units and acres treated, there are marked differences between the two. Key differences between the two alternatives are displayed in the table below.

ALTERNATIVE 2	ALTERNATIVE 3 modified
Proposes a Forest Plan amendment that would allow commercial harvest on 540 acres of late old structure (LOS) stands.	No commercial treatment of LOS; no forest plan amendment.
885 acres of WUI treatment.	975 acres of WUI treatment.
Commercially thinned stands result in evenly distributed trees across the unit. Thus, these units appear denser.	Commercially thinned stands result in varying degrees so that the unit is very open in some areas with dense patches in others. Thus, these stands appear more open.
Treats all trees equally in regards to thinning; i.e., does not target lodgepole or fir trees.	Thins primarily lodgepole and mixed conifer, leaving ponderosa pine as the dominant tree in treated units.
Returns 229 acres to Fire Condition Class I.	Returns 6,877 acres to Fire Condition Class I.
Returns 9,283 acres to Fire Condition Class II.	Returns 2,402 acres to Fire Condition Class II.
Closes 10.5 miles of road.	Closes 18.4 miles of road.
	Retains approximately 141 acres of pine marten habitat.
	Diameter limit of 16”or 18” for ponderosa pine (depending on avg. stand diameter).
	Diameter limit of 18” for all white fir.

Comment: ***The EA provides no substantive analysis of cumulative effects of the planned project in combination with other ongoing and foreseeable projects. National Environmental Policy Act (NEPA) dictates that proper consideration of the cumulative impacts of a proect be detailed in the EA concerning possible environmental impacts and risks. Council of Environmental Quality (CEQ)***

regulations require that cumulative impacts be considered by adding the impacts of other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.The total magnitude of the environmental effects or srnall actions will sum to a much greater impact than that suggested by the analysis of the individual projects. The Bend/Fort Rock Ranger District has numerous projects planned for 2006.. . . We recommend that the Forest Service thoroughly analyze cumulative impacts from their many recent projects conducted within the Deschutes National Forest, as well as impacts from known and foreseeable future projects. (3 - 3)

Response: A discussion on past, present and foreseeable actions occurs on pgs. 51-53 of the EA, including a table that identifies the same (Table 3-1, p. 53). These projects were used for analysis by all the resource specialists. The discussion describes a brief overview of the project area in regard to past ownership and management of the forest vegetation from the 1930s to present.

There is a discussion of effects in each of the resource areas (pgs. 54-180). Where it is needed for clarity and management consistency, various subheadings by resource, such as for wildlife species, are delineated. Where applicable, the past, present and reasonably foreseeable actions were analyzed by alternative along with the actions outlined in the Lava Cast EA.

Comment: ***When conducting commercial thinning projects take the opportunity to implement other critical aspects of watershed restoration especially reducing the impacts of the road system and livestock grazing and establishing the ecological processes that will allow streams and fire regimes to recover.*** (1 - 17)

Response: Stands that historically and predominately were dominated by ponderosa pine have been encroached on by lodgepole and fir species. The resultant stand density makes them more susceptible to disturbance such as insects, disease and wildfire. Thinning (reducing stand density) and fuels treatment is designed to move forest stands towards historic conditions (HRV) which allows for the reintroduction of fire. This will make treatment units more resilient to disturbances such as stand replacing wildfire.

As referenced on pgs. 7 & 18 of the EA, there are no known perennial or intermittent streams within the project area. Furthermore, there are no treatments proposed within Riparian Habitat Conservation Areas (RHCAs) as defined in the Inland Native Fish Strategy (INFISH, 1995).

Requirements and mitigations (pgs. 38-46) are also designed to improve the resource conditions during and after implementation of this project.

The Lava Cast project area overlaps portions of the Sugar Pine Allotment (15,749 acres). The Sugar Pine Grazing Allotment is in vacant status and grazing cannot occur until such times as appropriate NEPA has been completed. The allotment is currently vacant with the last active year being 1994.

Comment: ***This is a very large project likely having significant impacts on soil, wildlife habitat, and fire hazard and therefore requires an EIS. The FONSI should be carefully prepared and will probably result in a "FOSI." [Finding of Significant impact]. On[e] prime example of significance: 981 acres of existing dead wood removal, and 3425 acres of reduced recruitment of dead wood habitat, and the Forest Service cannot predict the effects of treatment on large snags (p 217). Other***

indicators of significance include: road density, cumulative soil impacts, cumulative wildlife habitat impacts, etc. (1 - 14)

Response: Effects analysis does not disclose any significant impacts for any of the resources and thereby an EIS is not necessary.

Comment: ***Although the Forest Service provides an in depth analysis of the effects of using herbicides on the units, we [Juniper Group/League of Wilderness Defenders] do not think that competing vegetation is a sufficient reason to justify herbicide use. Ceanothus and Manzanita, the main competing vegetation, are both recognized to play positive roles in pine seedlings and health. Not to mention the benefit of both of these plants to bird and mammal species. Fox Sparrows tend to nest predominately in Manzanita. The presence of healthy, green, well-spaced Ponderosa Pines on the units, the benefits of bark beetles and mistletoe and the threat of spread posed by disturbance, through logging and the use of herbicides, makes us question the purpose and need of "making" the forest healthy by logging and using herbicides to get rid of insects and brush that may cause fire.*** (3 - 53)

Response: There is no proposal to use herbicides in the Lava Cast Project.

Comment: ***Another alternative that must be considered is a wildlife and restoration alternative that includes partial commercial thinning with variable densities and diameter limits ranging from 14 to 16 inches (dbh). BLM's La Pine HFRA fuels reduction project, and the Deschutes NF's Long Prairie Mistletoe Reduction, and Metolius Basin projects all employ dbh limits lower than 21" to better meet ecological and wildlife objectives. BLM's is capped at 16" dbh above which trees may not be cut, while the Deschutes adopted 18" dbh limits for P. Pine in the Long Prairie project and across the Metolius project. NEPA mandates that alternatives be reasonable, based in sound science, be capable of effectively accomplishing purpose and need ecological goals, and comply with federal policy laws as well as the Deschutes LRMP. Scientific research recommends managing for optimum cavity nester wildlife habitat. As nest trees are deficient for many old forest dependent species throughout the forest, retaining all trees above 14" dbh (or 16", etc.) will help ensure viable wildlife populations and habitat for cavity nesting species of concern. Such measures will also help provide far better for restoring the ecological integrity of the project area.*** (3 - 5)

Response: Within the Lava Cast Project EA one alternative which was considered had a diameter cap of 12” dbh (EA p. 48). However within the Lava Cast Project average stand diameters and diameter averages for dominant and codominant trees is highly variable. This variability is due to stand densities, thinning treatments since stand establishment and beetle mortality. Some stands have high tree densities while others have low tree densities based primarily on whether they received precommercial thinning or commercial thinning in the past four decades. The variability in stand density has had the effect of high variability in dominant and codominant tree diameter. Stands which have had lower tree densities have had larger diameters. Those where insect attacks have occurred have smaller diameters. Many stands which had thinning or were established with low tree densities have trees which are larger than 20” common as dominants while some dense stands are lucky to have 14” diameters in the dominant position. A diameter cap for the planning area would keep stands from being treated to meet the project objectives (moving towards HRV).

Some of the larger tree component would be retained in Alternative 3 modified with the diameter limits applied (also please see response to 1-22, p. 224).

Comment: ***We find the proposed action involving commercial thinning and fuels treatment on 9,299 acres or 25.8% of the total planning area and commercial harvest of 27.2 MMB to be excessive and much larger than recent DNF commercial harvest activities and also larger than was described in the scoping letter of May 2004. This large project requires the development of a full EIS. Logging that is environmentally unsustainable jeopardizes a functioning forest ecosystem. Justifications for a commercial harvest of this magnitude are weak and proposed actions provided in your EA do not appear to offer value to restoring the forest ecosystem to a self-sustaining condition. We specifically question the effectiveness of the proposed treatments and are very concerned about the potential loss of wildlife habitat and high quality forest resources. While this project lies outside the Northwest Forest Plan (NFP) boundaries, it contains valuable wildlife habitat and does interface very important habitat areas including the Newberry National Volcanic Monument and the Deschutes Wild and Scenic River area.*** (3 - 1)

Response: The Lava Cast Project EA proposes 9,534 or 9,299 commercial harvest acres (Alternative 2 & 3 respectively) while the scoping letter in May, 2004 proposed 4,865 acres of commercial thinning. This difference is caused by further data collection of forest stand conditions. The scoping letter estimated timber volume to be 21 MMBF. Again the increased estimate of volume (27.6 and 26.4 respectively) is a result of an increase in treatment acres based on updated forest conditions.

The project evolved from the initial concept that was put forth in the scoping letter. (Also, see response to 1-13 and 3-4.) As more data is collected in the field, and more alternatives are considered and analyzed, estimates are improved and the project adjusts to the new data.

Resource specialists defined their "scope of analysis" that describes what was analyzed. This can be found at the start of each resource area effects analysis section in Chapter 3. Specialists' analysis did not find any significant effects from the project proposal. Consideration for wildlife habitat, including that in Newberry National Volcanic Monument, was considered and addressed in the effects section (pgs. 74-133). Connectivity corridors, above the minimum standards set in the Eastside Screens, would be designated with the implementation of this project would provide movement north and south, as well as east and west through the project area (EA p. 46).

Comment: ***Given that the unroaded areas are so rare and ecologically valuable, the EA should have considered the extent to which these areas function like roadless areas in spite of the fact that they may have been previously railroad logged and the extent to which the unique values of these areas would be adversely affected by logging,*** (1 - 10)

Response: The EA considered how unroaded areas function in regard to the existing condition and in relation to proposed treatment activities (pgs. 167-170).

Comment: ***Grazing contributes to degradation of water quality, destruction of riparian habitat, and the spread of noxious weeds. Grazing directly contributes to harmful impacts to birds and mammals. NEPA requires the Forest Service to take a "hard look" at the environmental consequences of its decision. The EA did not adequately address the impacts of grazing. Cumulative impacts from past grazing exist throughout the project area, which along with logging has resulted in significant harm to area soils. Although it reportedly has not been grazed by livestock for the past 5 years, at least one grazing allotment exists within the project area. The new EIS must correct the failure of the present***

EA to address impacts from livestock grazing. This EIS must address cumulative impacts from past grazing, as well as impacts from potential future grazing use of the area - and assess these impacts in combination with those from the proposed project itself. (3 - 54)

Response: The Lava Cast project area overlaps portions of the Sugar Pine Allotment (15,749 acres). The Sugar Pine Grazing Allotment is in vacant status and grazing cannot occur until such times as appropriate NEPA has been completed. The allotment is currently vacant with the last active year being 1994.

Comment: ***If the BFR chooses to use the ongoing Deschutes and Ochoco National Forest OHV process to identify which user-created trails and roads will be left open, ODFW recommends the BFR also defer vegetation treatments that will reduce hiding cover until pertinent OHV decisions are made that will mitigate any further impacts to wildlife habitat and populations. Fish and wildlife recreational opportunity is a 2.1 billion dollar industry annually in the state of Oregon (2001 estimates). Actions that impact wildlife habitat could cause a decline in this economic base that is highly valued by Deschutes County and the State of Oregon. (see attached Fast Facts About the Economic Contributions of Hunting, Angling and Wildlife Viewing).*** (2 - 5)

Response: Hiding cover is above Forest Plan standards after implementation of the Lava Cast project for either action alternative (EA pgs. 111-112, 131). Although the exact impacts to deer populations are difficult to measure, treatments would enhance long-term habitat. Measures will be taken to minimize short-term impacts from vegetation treatments (e.g. retention patches and road closures and decommissioning).

Comment: ***The Sunriver Owner's Association (SROA) supports Alternative 3 vegetative treatment as described within the Lava Cast Project Environmental Assessement (EA), November 2006. . . .this alternative addresses community concerns based on the following:***

Alternative 3 will result in historic ponderosa pine forest conditions and produce large openings to reduce fire spread. Tree thinning will increase forest health and reduce Mountain Pine Beetle risk in the Sunriver area. (4 - 2)

Comment: ***The Sunriver Owner's Association (SROA) supports Alternative 3 vegetative treatment as described within the Lava Cast Project Environmental Assessement (EA), November 2006. . . .this alternative addresses community concerns based on the following:***

The planning area borders the Sunriver Wildland Urban Interface to the southeast along South Century Drive/Spring River Road, a major egress route for the community. Treatment of units in this location will increase fire safety and aid evacuation for approximately 4,000 Sunriver homes. (4 - 1)

Response: Both alternatives would reduce the risk of wildfire. However, the prescription for Alternative 3 would move 6,877 acres to Condition Class I, whereas Alternative 2 does this only on 229 acres. Alternative 3 also treats 90 more acres of WUI (975 acres) than Alternative 2 (885 acres).

Comment: ***Don't thin to uniform spacing. Use variable density thinning techniques to establish a variety of microhabitats, break up fuel continuity, create discontinuities to disrupt the spread of other contagious disturbances such as disease, bugs, weeds, fire, etc.*** (1 - 25)

Comment: ***The scale of patches in variable density thinning regimes is important. Ideally variability should be implemented at numerous scales ranging from small to large, including: the scale of tree fall events; pockets of variably contagious disturbance from insects, disease, and mixed-severity fire; soil-property heterogeneity; topographic discontinuities; the imprint of natural historical events; etc.*** (1 - 31)

Comment: ***Retain patchy clumps of trees which is the natural pattern for many species.*** (1 - 26)

Comment: ***Use your creativity to establish diversity and complexity both within and between stands. Use skips and gaps within units to help achieve diversity. Gaps should be small, while skips should be a little larger. Gaps should not be clearcut but rather should retain some residual structure in the form of live or dead trees. Landings do not make good gaps because they are clearcut, highly compacted and disturbed, more likely subject to repeated disturbance, and directly associated with roads.*** (1 - 29)

Response: The idea of variable density thinning was included in Alternative 3, the preferred alternative, of the Lava Cast EA. Page 30 "Thinning would be done…to create gaps of approximately 2 acres in size in the harvest unit. Thinning would also be done to varying degrees so that there are dense patches of vegetation along with light moderate and heavily thinned areas."

Comment: ***Since there is such a low stream density in this planning area, the untreated "skips" should be more like 20% of each unit instead of 10% as proposed.*** (1 - 8)

Response: There was no scientific citation to this comment and thereby nothing scientific to review for consideration. Treatments in the Lava Cast Project meet the LRMP for untreated areas in blackbark pine of 10%. "Approximately 10 percent of treated stands will be in clumps that will provide visual screening throughout the area and meet the following conditions: a minimum of ½ acre in size, which have not been thinned or harvested for at least 20 years. Small clumps will be suitable in dense strands but larger clumps may be needed in more open stands. Dispersed throughout the unit so that visual screening is provided by the clumps in combination with topographic features." (Deschutes National Forest LRMP WL-59 blackbark pine management)

Comment: ***We strongly oppose excessive commercial harvest to support marginal improvements to natural fuel loads and in growth rates at the cost of quality habitat and valuable resources. The proposed commercial harvest treatments typically will involve removal of 30 to 50% of the standing trees (thinning to a basal area of 40 sqft/acre or less) and up to 80% of the trees in identified mistletoe infected areas. Such aggressive tree removal is neither necessary nor appropriate to maintain long-term forest health. Most treatment prescriptions allow cutting of ponderosa pine up to a dbh value of 21 inches. Very few trees (less than 1%) fall into the 2l inch and larger dbh category. Thus these prescriptions effectively allow cutting of all trees to meet wide space thinning requirements and basal area limits on a per acre basis.*** (3 - 12)

Response: The levels of thinning prescribed in the Lava Cast EA are to meet long term stand health conditions. The levels were calculated using research by Cochran, Booser and Maffei. Thinning to the levels prescribed meets the site potential and keeps a majority of stands not susceptible to bark beetles for the next two decades. (Cochran et al 1994 Suggested Stocking Levels for Forest Stands in Northeastern Oregon and Southeastern Washington. PNW RN-513 USDA Forest Service. Maffei et al.

1996 White Paper: Definition and Procedures for Classifying Stands as Imminently Susceptible to Insect Attack and Wildfire. Deschutes National Forest. Bend Oregon. Booser & White (undated) Calculating Maximum Stand Density Indexes (SDI) for Deschutes National Forest Plant Associations.)

Comment: . . .*"capturing mortality" will reduce/eliminate the natural process of snag creation….* (1 - 11)

Comment: ***Recognize that thinning captures mortality and that plantation stands are already lacking critical values from dead wood due to the unnatural stand history of all clearcut and planted stands.[1]***

[1] Tom Spies made some useful observations in the Northwest Forest Plan Monitoring Synthesis Report: "Certainly, the growth of trees into larger diameter classes will increase as stand density declines (Tappeiner and others 1997). At some point, however, the effect of thinning on tree diameter growth levels off and, if thinning is too heavy, the density of large trees later in succession may be eventually be lower than what is observed in current old-growth stands. In some cases, opening the stand up too much can also create a dense layer of regeneration that could become a relatively homogeneous and dominating stratum in the stand. Furthermore, if residual densities are too low, the production of dead trees may be reduced (Garman and others 2003). Thinning should allow for future mortality in the canopy trees." http://www.reo.gov/monitoring/10yr-report/documents/synthesis-reports/index.html (1 - 32)

Response: The thinning of blackbark ponderosa pine stands does reduce the mortality levels. The natural process of snag creation includes fire, insects, disease, and weather. Reducing mortality derived from insects and fire does not mean that mortality agents will not affect trees left in the stand. Also, adjacent stands of high density still contribute insects and diseases. Both prescribed fire and wildfire will occur in stands typically killing some trees. Fewer trees are likely to die though after proposed treatments, thus larger trees will be available in the future for snags. Within each treatment unit there will be a minimum of 10% of the area left untreated for wildlife/snag diversity. Also, recruitment of snags in the Lava Cast project area will occur on approximately 28% (approx. 10,080 acres) of the area that remains susceptible to bark beetles. (Lava Cast Project EA page 67)

Comment: ***Retain abundant snags and course wood and green trees for future recruitment of snags and wood. Retention should be both distributed and in clumps so that thinning mimics natural disturbance. Retention of dead wood should generally be proportional to the intensity of the thinning, e.g., heavy thinning should leave behind more snags not less. Retain wildlife trees such as hollows, forked tops, broken tops, leaning trees, etc.*** (1 - 33)

Response: Snags in the Lava Cast planning area are not planned to be harvested. Some snags may be felled to improve safety during operations at landings and along travel corridors. Green trees on page 106 of the Lava Cast EA states: "Measures to retain as many snags and logs as possible will help mitigate some of these short-term effects. In the long-term, improved growth of trees and retention of adequate GTRs will help ensure a more stable supply of the larger snags and logs that the planning area is currently lacking, and likely has lacked since the early 1900's". Damaged trees which have nests or features such as dead portions of trunks are left for wildlife use.

Some of the larger tree component in Alternative 3 modified would be retained for wildlife habitat, including recruitment for future snag replacement.

Comment: ***Mitigate for the loss of LWD input by retaining extra snags and wood in riparian areas. Recognize that thinning captures mortality that is not necessarily compensated by future growth.[2]***

[2] "[T]he data have not supported early expectations of 'bonus' volume from thinned stands compared with unthinned. . . .[T]hinnings that are late or heavy can actually decrease harvest volume considerably." Talbert and Marshall. 2005. Plantation Productivity in the Douglas-fir Region Under Intensive Silvicultural Practices: Results From Research And Operations. Journal of Forestry. March 2005. pp 65-70. citing Curtis and Marshall. 1997. LOGS: A Pioneering Example of Silvicultural Research in Coastal Douglas-fir. Journal of Forestry 95(7):19-25. (1 - 38)

Response: There are no riparian areas in the Lava Cast planning area (EA pg. 18).

Comment: ***Thin heavy enough to stimulate development of some understory vegetation, but don't thin so heavy that future development of the understory becomes a more significant problem than the one being solved with the current project.*** (1 - 30)

Response: Understory vegetation response is expected following thinning. The response following fuels treatments will reduce the understory for 15–20 years. The understory response following surface fuels treatments will result in an increase in grasses and a decrease in brush. The resultant fuels burn at lower intensities. Maintenance treatments in the future are expected as shrub and understory vegetation moves towards a more intensive fire potential.

Comment: ***Thin from below, retaining the largest trees. Retain all large trees and most medium sized trees so they can recruit into the larger classes of trees and snags. Regardless of size, retain all trees with old-growth characteristics such as thick bark, yellowing bark, flat top, asymmetric crown, broken top, forked top, etc. These trees have important habitat value and human values regardless whether they are 21" dbh.*** (1 - 21)

Comment: ***. . . removal of trees on any of the planning units identified for commercial harvest must provide for the long-term sustainability of forest health, wildlife habitat, clean water, and recreation values. These larger trees sustain vigor of ponderosa stands and will allow a greater number of larger trees to mature gradually to late and old structure (LOS) conditions. Fuel reduction efforts should be focused to protect these latter areas including stands of multi-storied ponderosa providing diverse habitat for numerous wildlife species.*** (3 - 9)

Comment: ***We strongly oppose the aggressive commercial harvest and thinning prescription calling for the removal of trees under 21 dbh to basal values of 40 to 60 sq.ft./acre. Since remaining trees with dbh larger than 21 inches are far fewer than 1% of the standing trees, this prescription potentially removes the largest trees within each listed planning unit. More than half of the units identified for commercial harvest and thinning have been previously treated during the last cutting cycle. We strongly recommended that these plans be modified to eliminate treatment of units that have not fully recovered from the previous harvest.*** (3 - 8)

Response: Thinning in the Lava Cast Project will "remove(s) trees selecting the smallest, least healthy trees first (usually trees which are intermediate in size or suppressed: could be of varying dbh, but not

over 21 inches) then selecting trees that are competing with each other in the larger size groups." (Lava Cast EA page 28).

When the Lava Cast area was owned by Shevlin-Hixon and logged in the 1920s and '30s some small unmerchantable trees were left uncut. Typically these trees now have yellow bark characteristics and are trees mostly well over 21" in diameter.

Some of the larger tree component would be retained in Alternative 3 modified with the diameter limits applied (also please see response to 1-22).

Comment: ***Use the historic range of variability as a guide, but don't just focus on seral stage. Consider also the historic abundance of large trees, large snags, roadless areas, etc. all of which have been severely reduced from historic norms.*** (1 - 18)

Response: In the long-term, improved growth of trees and retention of adequate GTRs (green tree replacement) will help ensure a more stable supply of the larger snags and logs that the planning area is currently lacking, and likely has lacked since the early 1900's.

Comment: ***Prioritize treatment of the dense young stands that are most "plastic" and amenable to restoration. Another priority is to carefully plan and narrowly target treatments to protect specific groves of fire-resistant, old-growth trees that are threatened by ingrowth of small fuels.*** (1 - 20)

Response: In the Lava Cast project stands are described as follows: "… ponderosa pine stands are dominated by 80 year old ponderosa pine with lodgepole pine and in a few places white fir. The stands tend to be dense stands of poles with heavy fuels from beetle mortality." (Lava Cast EA page 55) These are the majority of stands selected for treatment and are able to respond well to treatment.

The Lava Cast EA proposes a Forest Plan Amendment to allow treatment in LOS stands with younger understory "to permit commercial thinning on 540 acres of late old structure (LOS) ponderosa pine and lodgepole pine stands to reduce the risk of loss do to insect and disease..."(Lava Cast EA page 32).

Comment: ***While the Bend-Fort Rock Ranger District does not seem to dispute that the impacts of logging have been significant, the Deschutes NF has failed to adequately quantify and qualify the impacts of the current proposal to log the critical threads of mature and old growth forest habitat connecting the planning area, inventoried roadless areas, uninventoried roadless areas, and LOS areas.*** (3 - 22)

Response: Effects to resources are on pages 55-180 of the EA. Effects to old growth, LOS, inventoried roadless areas, and uninventoried roadless have been adequately addressed in each of their respective resource effects discussion areas.

Comment: ***Retain and protect under-represented species of conifer and non-conifer trees and shrubs. Retain patches of dense young stands as. . . Pools for recruitment of future forests.*** (1 - 28)

Response: The Lava Cast Project EA favors clumps of trees for variability in the mitigation measures "To offset the loss of hiding cover in these areas, 10% of the units will be retained in untreated clumps,

one half acre and larger, dispersed throughout the unit." The EA also would release willow and aspen clones in and around rock outcrops from overstory blackbark ponderosa and lodgepole pine (Lava Cast Project EA page 42).

Comment: ***The EA should provide a clear description of existing conditions within each forest unit to be treated including the approximate number of trees in each dbh size category. Treatment specification must show how many trees in each size category will be removed.*** (3 - 10)

Response: There is no NEPA requirement to have site specific descriptions for each and every stand. Nor is it relative to the issues raised. Stand conditions that remain after treatment is the important part of returning stands to historic conditions. Exams and site specific prescriptions are used for each unit in implementation to ensure the activities meet the objectives of the EA.

Comment: ***We oppose the proposed amendments for the Deschutes National Forest Land and Resource Management Plan. Under Alternative 2 this amendment allows commercial harvest of some of the largest ponderosa on 540 of the 1420 total acres of late and old growth structure and undermines the long established Eastside Screens management guidelines by allowing commercial thinning and uneven-age management. Even age stands of ponderosa pine have resulted from commercial clear cutting operations conducted in the area 70 years ago. Justification is made on the basis that late and old growth structure (LOS) is below the historical range of variability (HRV). Ponderosa pine reforestation will take substantially more than 100 years to establish any HRV pattern. Thus this EA logic is totally flawed. It makes no sense to use the LOS criterion to evaluate younger stands as failed examples of HRV. Clear cutting of these young ponderosa stands will result in failure to restore the forest to a sustainable condition. We strongly recommend the elimination of commercial thinning in LOS areas as defined by the Eastside Screens. If thinning is to occur in LOS areas it should be restoration based and only for trees less than 12 inches dbh.*** (3 - 6)

Response: There is no clearcutting planned in the Lava Cast Project. The description in the Lava Cast EA of Alternative 3, the preferred alternative says "There would be no harvest treatment of LOS in this alternative." (please see EA page 30)

Comment: ***We oppose proposed treatments to "control" beetle infestation, especially within units where existing ponderosa and mixed conifer stands are snag deficient and/or are providing essential habitat for forest dependent wildlife species. Ecological scientific research, including the Crater Lakes study assessing the ineffectiveness of decades of logging to "control" bark beetles, resoundingly concludes that such efforts are ineffective and doomed to failure. Studies clearly show that such plans are tantamount to destroying the forests by logging in order to "save" them from beetles or other insect species. Yet, bark beetles and other forest insects are native species that play rnillenas-long evolutionary integral roles within forest ccosysterns. When forest management protects natural processes, and provides for optimum habitat for native insectivore species, such as woodpeckers and other snag nesting avian species, bark beetle populations may occasionally flare - but are kept within naturally fluctuating cycles by woodpeckers and other insectivores, and as well by the vagaries of nature.*** (3 - 11)

Response: There is no proposal in the Lava Cast EA to "control" bark beetles. In the Lava Cast Project EA "This alternative proposes commercial thinning and fuels treatment to reduce bark beetle susceptibility" and to "develop stands to be more resilient to influences such as wildfire and insects and

disease outbreaks." (EA pgs. 26 & 29). There is a marked difference between controlling bark beetle infestations which is questionable and reducing the potential for bark beetle outbreaks. Studies and observations on the Bend Fort Rock District indicate high effectiveness in reducing bark beetle susceptibility through thinning on a landscape level. (Lava Cast Project EA page 64.)

Comment: ***In general, as long as wildlife habitat and cover needs are maintained, we support the removal of forest debris, removal of fire ladder material, and the removal of trees with dbh of less than 6 inches especially where these young trees such as lodgepole grow in clumps and where such action will significantly reduce the risk of an intense wildfire. Prescribed fire treatments and manual pre-treatments should be prioritized over mechanical treatments. Mechanical treatments should be considered only where prescribed fire is too risky for an initial treatment.*** (3 - 7)

Response: The Lava Cast Project EA does propose to thin trees less than 6 inches in diameter. Units with mechanical treatments of fuels will be followed by prescribed burning. An exception are those units which, following thinning, would contain too much white fir or lodgepole pine to allow fire without mortality of desired trees.

Comment: ***The frequent objective given by the DNF to support commercial harvest is reduction of mountain pine beetle risk. The effectiveness of Ponderosa Pine thinning in Central Oregon was studied by the Pacific Northwest Research Station (Cochran and Barrett, March 1999). These studies demonstrated that tree mortality from the mountain pine beetle was only weakly related to stand density index (SDI). Investigators estimated that tree mortality was minor over a five-year period when the SDI was less than 240. Their data gathered over a 30-year period provided little evidence that tree removal is an effective method to reduce mountain pine beetle infestation except in trials involving reduction of stocking levels to minimum values. We oppose minimum stocking levels that severely darnage wildlife habitat value. The EA failed to properly evaluate this and related research regarding the proposed treatment to control beetle infestation in units where the existing ponderosa and mixed conifer stands have SDI values less than 200. NEPA requires the disclosure of applicable science to the public and decision-maker. A full EIS is essential for this project. The new EIS must incorporate and disclose all relevant science, and present alternatives based soundly in the ecological needs of this forest ecosystem. We strongly recommend a less aggressive, ecologically and scientifically sound approach to reducing the risk of mountain pine beetle infestation. In units where beetle infestation is high, we specifically recommend thinning only infected small diameter young trees - especially where they grow in dense clumps.*** (3 - 14)

Response: The report by Cochran and Barret is a thinning growth study of varying spacing which was conducted on the Deschutes National Forest. At the start of the study the average stand diameter was 1 inch in diameter. At the conclusion of the study it tended to be less than 9" diameter breast height except for the most open and lowest SDI stands. A substantial portion of the stocking needs to be above 9" SDI to support a beetle attack. The site used in the study was also a more productive site with an Upper Management Zone SDI of 270. The Lava Cast project area has, at its highest, an Upper Management Zone of 200 SDI. The study conclusion recognized the connection between beetles and density. Although mortality in this study has been low future losses could be high. Stand density levels in combination with individual tree size greatly affect pine beetle related mortality in some ponderosa pine and lodgepole pine studies. (Thirty-five Year Growth of Ponderosa Pine Saplings in Response to Thinning and Understory Removal. Cochran P.H. James W. Barret PNW-RP-512 July 1999).

Comment: ***Fire is a natural part of the ecosystem, especially in the drier forests found east of the Cascade crest. Decades of fire suppression have resulted in dense, overstocked forests that are highly susceptible to catastrophic wildfire. Bark beetles and mistletoe are also natural processes that have benefits in the natural succession of the forests. These benefits are not analyzed in the EA.*** (3 - 50)

Response: Mistletoe and bark beetles are a natural part of the forest ecosystem in this area and are discussed in the no action alternative effects. The part which is not natural due to logging of extensive acres as private land in the 20's and 30's (EA p. 60), is a landscape of young ponderosa pine in dense condition. This is not the historic condition which was a high percentage of the landscape in old and variable aged stands. Currently the landscape is young (less than 100 years old) very even-aged stands of ponderosa pine with mixes of fire sensitive species. The natural succession of stands in this area would include an ongoing mix of fire, bark beetle and mistletoe. Removing fire since establishment of the stands has changed the interaction of these disturbance mechanisms. This project attempts to reestablish the mechanisms of fire and insects and disease into the treatment units.

Comment: ***Some of the areas do have dense underbrush, which could lead to bark beetle problems, but this could be taken care of with simple small diameter pre-commercial thinning to restore the spacing for the larger trees. The EA makes several references to insects and disease to justify the proposed logging because the trees have an "imminent susceptibility" to beetle attack. The EA fails to demonstrate that the proposed logging is necessary to control them. The EA also fails to address other concepts of forest health that are not based solely on traditional silviculture objectives.*** (3 - 51)

Response: More information has been included in the Lava Cast Project EA from the Lava Cast Silviculture Vegetation Report to assist in clarifying the level of tree density which would determine whether a stand was imminently susceptible to bark beetles (Lava Cast Project EA page 64). Again the project is not proposing to control bark beetles, but is attempting to reestablish stands to HRV levels for stand density, which will then result in more historic beetle levels.

Comment: ***Treatment of mistletoe makes little sense because: a) it is ecologically more beneficial than not, b) attempts to treat it are ineffective because it is endemic to the stands until they are severely burned, c) attempts to treat it may be counter productive to the extent it reduces the likelihood of future severe fire that would in fact cure it.*** (1 - 16)

Response: The objectives of selecting against mistletoe are recognized in the Lava Cast EA (p. 64): "Both alternatives reduce the level of infection and spread within stands but would not eliminate it. Thinning of mistletoe infected trees in ponderosa pine opens the stand allowing the trees to grow faster than the spread of the mistletoe in the stand. This allows trees to grow large in size and to maturity and less chance of mortality do to mistletoe and other stresses."

Comment: ***The EA should have discussed the benefits of dwarf mistletoe to the forest ecosystem more fully. The fruit, foliage, and pollen of dwarf mistletoe are a food source for numerous birds, mammals, and insects. Dwarf mistletoe alters the growth patterns of infected trees, creating structural complexity within forests in the form of witches' brooms and snags, both of which are used by numerous wildlife species for nesting, roosting, and cover. Dwarf mistletoe only becomes a problem when the Forest Service attempts to artificially manipulate forests to become tree farms to grow timber at accelerated and unhealthy rates. Logging may increase mistletoe in the remnant stand and not decrease it as the Forest Service would like us to believe. Many mistletoe seeds that***

infect host trees do not readily produce aerial shoots known as latent infections. After thinning, 90% of all latent infections tend to appear within five years. (3 - 52)

Response: More information was added to the Lava Cast Project EA from the Lava Cast Silviculture Vegetation Report. Mistletoe in large old trees was typically a late infection which did not greatly impact the early growth of the trees. (Lava Cast Project EA page 63)

Comment: ***New evidence indicates that far more of the "dry" forests, rather than being typified low severity fire regimes, were in fact dominated by mixed severity fire regimes (including significant areas of stand replacing fire), so mixed severity fire is an important part of the historic range of variability that should be restored. The goal should not be a uniform low severity fire regime, but rather a wide mix of tree densities in patches of varying sizes. This objective can often be met by reintroducing fire.*** (1 - 19)

Response: This comment does not include scientific reference for "new evidence that indicates that far more of the dry forests…". The Lava Cast EA references on page 70 work done by Agee (1993) that shows historical fire records indicate low intensity fires maintained and thinned ponderosa and lodgepole pine stands on an average 7-15 year cycle.

Cadastral surveys from the 1800's describe the majority of the project area as ponderosa and lodgepole with only a minor area showing white fir. (EA pgs. 54 & 59 and Silviculture specialist report)

It is explained on page 68 of the EA that 66% of the area is classified as high to extreme hazard that would promote high to extreme wildfire behavior due to the exclusion of fire over the past 90 years. With the proximity of the project area to WUI (Wildland Urban Interface), it is not reasonable to re-introduce fire in these existing hazardous conditions (EA pgs. 71-73). Fire is prescribed in ponderosa stands after treating and reducing existing, over-abundant and hazardous fuel loads to levels that will emulate historic low intensity fire when applied.

Comment: ***Building 32 miles of new temporary roads for this project will . . .increase ignition risks, . . .*** (1 - 6)

Response: The short term risk of building temporary roads is necessary to achieve the long term benefit of reducing fuels on 9,512 acres to pre-settlement fuel levels represented by Fire Behavior Fuel Models 8 and 9 which reduces the fire behavior to low and moderate intensity should a fire start. (See discussion in the EA, page 72 – Proposed Action)

Comment: ***Fuel reduction to facilitate direct attack fire fighting only makes sense in places where fires are likely to be fought, such as likely fire lines and control points. Has an analysis been done to determine where those places are? Also, fire-fighting has it's own long list of environmental consequences that are "connected actions" and must be disclosed in the NEPA analysis. Please figure out a way to disclose, analyze, and if possible avoid the irony of modern fire fighting, that is, fire fighters can't even get close to the high intensity fires that we'd most like to stop, so we end up fighting and sometimes stopping the lower intensity fires that are ecologically beneficial and which we should probably let burn.*** (1 - 9)

Response: Due to the unprecedented population growth in central Oregon with additional urban interface home construction, and increased forest recreation use, the trend of human caused fire starts increases (as explained in EA-page 68 and 72). It would be impossible to exhaust and analyze all possible scenarios for fire starts, their locations and control points. With sixty percent of the planning area classified as having high or extreme wildfire behavior potential on a 90th percentile day (EA p. 68), fires would most likely be crown fire in existing fuel models. In this scenario, treating only expected control points would most likely be futile. For example, treating fuels only along a road which could be used as a successful control point for a ground fire would probably not be a control for a crown fire in a 90th percentile weather scenario.

In the Purpose and Need the project emphasis is to create forest conditions that provide for firefighter safety (EA pg. 10). In the Proposed Action on pg. 72 it explains that changing the fuel model profile from Fuel Models 3, 6 and 10 (high and extreme fire behavior potential) to Fuel Models 8 and 9 (low and moderate fire behavior potential) flame lengths would be reduced below 4 feet. It is calculated that firefighters can direct attack a fire withstanding calculated BTU's and rate of spread at 4 foot and below flame lengths. (Fire Behavior Fire Characteristics Chart – Andrews and Rothermel, 1982).

In the Affected Environment and Existing Conditions (EA pg. 68) it is described that the planning area is adjacent to WUI and that 60 percent of the planning area constitutes high and extreme fuel conditions that would promote high intensity fire behavior. In the purpose and need the emphasis to reduce wildland fire risk of catastrophic (or uncharacteristic fire) fire within the WUI and to approximate historic levels of late old structural stages. It is considered by fire management to be an unreasonable risk in the current high hazard conditions to let fires burn in such close proximity to WUI as the current conditions under 90th percentile weather does not warrant the safe direct attack by firefighters. The intent of the project is to create historic conditions in which fire burned with low intensity. Prescriptions would create conditions that mimic and achieve the benefit of low intensity fire that occurred historically and that naturally maintained low fire behavior fuel models. (See pgs. 68-73).

Comment: ***Recognize that thinning affects fire hazard in complex ways, possibly even making fire hazard worse because thinning: creates slash; moves fine fuels from the canopy to the ground (increasing their availability for combustion); thinning increases ignition risk; thinning makes the forest hotter, dryer, and windier; and makes resources available that could stimulate the growth of future surface and ladder fuels. Fuel reduction must find the sweet spot, remove enough of the small surface and ladder fuels while retaining enough of the medium and large trees to maintain canopy cover for purposes of microclimate, habitat, hydrology, suppression of ingrowth, etc.*** (1 - 23)

Comment: ***The use of commercial harvest thinning to reduce adverse wildfire risk, especially in cases involving stand replacement, remains a controversial issue. Recent scientific studies conclude that rather than thinning, it is soil protection and recovery efforts restoring soil moisture retention and availability during the summer's dry months that effectively reduces the risk of severe forest fires. Scientific research reveals that commercial thinning can increase the risk of severe fires by compacting soils, reducing soil moisture retention, and by opening up forest soils to increased solar exposure - with the resultant significant loss of essential moisture during the dry summer fire season. The post-fire analysis of the 2002 Oregon Biscuit fire now shows that pre-fire thinned stands were no more effective at retarding wildfire than stands with no thinning treatment. The use of thinning to reduce wildfire has not been fully documented and justified in the EA.*** (3 - 13)

Response: This responder does not reference the scientifc studies in the comment. Locally in the project area, soils are dry as a result of low annual precipitation or low available water capacity. Soil characteristics such as coarse texture, shallow depth, or high content of rock fragments limit the

available water capacity. Summers are typically moderately hot and dry, causing high daytime soil temperatures, especially on south aspects. The volcanic ash soils in the project area are coarse textured and dry out rapidly during the dry summer months. This phenomenon occurs with or without the removal of trees, and it is expected to have a minor influence on the risk of severe wildland fires.

A local fire manager (Mark Rapp, Fire Management Officer) witnessed the effect of previously thinned Fuzzy unit # 9 on fire behavior when the 18 fire moving with "stand replacing" velocity hit this unit and stopped with no burning occurring on the unit except for small smoldering spots. The 18 Fire occurred on July 23, 2003 just south of and adjacent to the Lava Cast planning area. The Fuzzy units had been previously commercially thinned and residual fuels piled and burned. Mechanical mowing had decreased the brush height and prescribed fire had been applied. This treatment proved effective in retarding the 18 Fire growth. This is the same fuels treatment that is prescribed for the Lava Cast project.

The 2002 Oregon Biscuit fire occurred west of the Cascades in the coast range in a different ecosystem than that east of the cascades. The differences in these ecosystems have differing influences on fire behavior. For example, a wet climate exists west of the cascades while a dry climate is typically known east of the cascades. Topography on the westside can be mountainous and very steep while the eastside Lava Cast project is mostly flat. The fuel components, vegetation type, and soils differ from west to east of the Cascades. Post thinning fuels treatments also differ from the westside Cascade to eastside Cascade. These are key differences that affect fire behavior and it is not reasonable to utilize science from the west of the Cascade post Biscuit fire analysis to this eastside Lava Cast planning area.

In the Fire and Fuels Scope of the Analysis on page 67 of the EA it explains that fire behavior fuel modeling and the Forest Vegetation Simulator (FVS) – Fire and Fuels Extension (FFE) were used to determine the probability of stand replacing fire by crown fire. Further explanation on page 72 of the EA verifies the FVS prediction using the desired fire behavior fuels models (8 and 9). The silviculture and fuels prescriptions are designed to reduce fire hazard. As shown during modelling, should a fire start in areas treated to Fuel Model 9 conditions, the fire should stay on the ground and not accelerate into a crown fire.

Comment: ***Mechanical thinning and prescribed fire are proposed for numerous units in close proximity of Sunriver. Due to health concerns and high summertime population, we (SROA) request burning be conducted during times of the year when tourist visitation is low and conditions minimize smoke intrusions into Sunriver.*** (4 - 3)

Response: Under Management Requirements and Mitigation Measures (EA p. 40) it explains that burning will follow Oregon State Smoke Management specifications and will be prescribed under northwest to west wind conditions to disperse smoke away from urban areas. The Lava Cast project area lies south and east of the Sunriver area. Smoke under this prescription would blow to the east away from Sunriver.

Comment: ***. . ."capturing mortality" will reduce/eliminate . . .soil qualities that are still recovering from past logging . . .*** (1 - 12)

Response: The soils analysis for the Lava Cast project fully analyzed all past actions, including timber management activities, and identified current levels of detrimental soil conditions within each of the proposed activity areas (EA, pages 136-139, 152-153, and Appendix D of the EA). Regional policy

(FSM 2520, R-6 Supplement No. 2500-98-1) lists two conditions that may affect design and implementation of new activities in previously managed areas (EA, page 142). Following project implementation (including subsoiling mitigation), the analysis concludes the following: "In harvest units where less than 20 percent detrimental soil impacts exist from prior activities, the cumulative amount of detrimentally disturbed soil would not exceed the 20 percent limit following project implementation and restoration activities" and "In harvest units where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects would not exceed the conditions prior to the planned activity and some units would result in a net improvement in soil quality. Both action alternatives balance the goal of maintaining and/or improving soil quality following project implementation and soil restoration activities" (EA, page 154).

Comment: ***Building 32 miles of new temporary roads for this project will . . .disturb soils, . . .*** (1 - 5)

Comment: ***Protect soils by avoiding road construction, . . .Where road building is necessary, ensure that the realized restoration benefits far outweigh the adverse impacts of the road, build the roads to the absolute minimum standard necessary to accomplish the job, and remove the road as soon as possible to avoid firewood theft and certainly before the next rainy season to avoid stormwater pollution.*** (1 - 39)

Response: No new roads would be constructed and retained as part of the transportation system. Under Alternatives 2 and 3, approximately 32 miles of temporary roads would be established or re-established to allow access to activity areas proposed for commercial harvest (EA, pages 32 and 144). Temporary roads are built to low specification, just enough to get equipment into landings and would be obliterated at the end of the timber sale activity (EA, page 32). Many of these spur roads would consist of re-opening short segments of old access roads from previous entries (EA, page 151). The re-use of existing road prisms would not cause additional soil impacts because machinery access would occur on previously disturbed sites. None of the temporary road locations would require excavation of cut-and-fill slopes because they are located on nearly level to gentle slopes (EA, page 151). The magnitude of soil disturbance associated with temporary roads for this project would be essentially the same as the disturbed widths of primary skid trails. Upon completion of post harvest activities, all temporary road segments would be subsoiled (obliterated) to rehabilitate disturbed soils on compacted road surfaces (EA, pages 144-145). Subsoiling treatments on existing road segments, which are used as temporary roads for this project, would help move existing conditions toward a net improvement in soil quality.

There are no known perennial or intermittent streams, lakes, ponds, reservoirs, or wetlands within the project area (EA, page 7).

Comment: ***Protect soils by . . . minimizing ground-based logging, and avoiding numerous, large, burn piles.*** (1 - 40)

Response: The Forest Service agrees that plans for projects must include provisions for protecting and maintaining the productivity and hydrologic functioning of soils. The management requirements, Best Management Practices (BMPs), and project design elements listed for the soil resource (EA, pages 39-41) are all designed to avoid or minimize potentially adverse impacts to soil properties. The amount of new disturbance associated with temporary roads and logging facilities would be limited to the minimum necessary to achieve management objectives (EA, pages 148 – 150). Operational guidelines

for equipment use provide options for limiting the amount of surface area covered by logging facilities and controlling equipment operations to minimize the potential for soil impacts in random locations of harvest units (EA, page 158).

Soil restoration (subsoiling) treatments would be applied to rectify impacts by reducing the cumulative amount of detrimentally compacted soils committed to roads and logging facilities. These conservation practices comply with Regional policy and Deschutes LRMP standards and guidelines that limit the extent of detrimental soil conditions (EA, pages 148 – 150, 159-160, and 182 – 183). Both action alternatives would result in fewer activity areas with detrimental soil conditions that exceed the LRMP standard compared to existing conditions (EA, page 152, Table 3-32).

The EA (page 146) acknowledged that "Burning large concentrations of machine-piled slash would cause severely burned soil because heat is concentrated in a localized area". However, this method would not cause additional soil impacts because the piling and burning would occur on previously disturbed sites, such as roads, skid trails, and log landings that already have detrimental soil conditions (EA, page 149).

Comment: ***Grapple piling is also very hard on soils and will cause . . . Adverse impacts. Using whole tree yarding will remove too many nutrients from the site. A portion of the green tops should be removed and left well distributed in the units. Whole tree yarding also requires large landings to handle all the slash and large burns piles that harm soil. The EA (p 144) concludes that grapple piling and pile burning won't add to cumulative impacts because they will occur on already disturbed sites. This doesn't make sense because the impacts of these activities may be qualitatively different and more intense than the previous disturbance.*** (1 - 7)

Response: The effects of slash disposal and fuel reduction treatments to the soil resource are addressed in the EA on pages 146 – 148 and 157 – 158. Most of the slash generated from commercial harvest would be machine piled and burned on log landings and/or main skid trails. Under both action alternatives, grapple machinery would be used to pile slash on previously disturbed sites such as existing roads and primary logging facilities. There would be no machine piling operations off designated logging facilities in random locations of activity areas. This slash disposal method would not result in a net increase in detrimental soil compaction because the equipment would operate off the same roads and designated skid trails used during harvest and yarding activities. Burning the machine-piled slash would cause severely burned soil because heat is concentrated in a localized area. However, this method would not cause additional soil impacts because the piling and burning would occur on previously disturbed sites that already have detrimental soil conditions (EA, p. 147).

The EA (page 157) acknowledged that mechanized whole-tree yarding would reduce potential sources of future woody materials that provide ground cover protection and a source of nutrients on treated sites. However, it is expected that sufficient sources of coarse woody debris (greater than 3 inches in diameter) would be available after mechanical thinning activities to meet recommended guidelines for wildlife habitat and soil productivity objectives. The EA (page 145) states that the Forest average for log landings is one landing (100 feet by 100 feet) for 10 acres of harvest (approximately 2 percent of the unit area).

Comment: ***The EA proposed alternative 2 will have impacts on soil, including destruction of microbiotic organisms, soil compaction, and soil erosion. A total of 1199 acres in 76 planning units are expected to have detrimental soil conditions from proposed treatments exceeding 20%. Grazing,***

timber sales, and wildfires have already heavily impacted these soils. Forest Service field research shows that the soil impacts fiom previous timber harvests are still very visible. Because of the preexisting damage, even slight use of these soils is likely to have significant detrimental environmental effects. (3 - 16)

Response: Under Alternative 2, the summarized information in Table 3-32 (EA, page 152) shows that 1,199 acres within 76 activity areas would have detrimental soil conditions that exceed 20 percent of the unit area following the proposed harvest and yarding activities with no mitigation of the effects. Under both action alternatives, project implementation would include subsoiling mitigation to reduce the cumulative amount of detrimentally compacted soil within activity areas which are expected to exceed Regional policy and LRMP standards and guidelines. All 76 of these activity areas would receive subsoiling mitigation treatments on all temporary roads and some of the primary skid trails and log landings to comply with management direction (EA, page 41). Both action alternatives would result in fewer activity areas with detrimental soil conditions that exceed the LRMP standard when compared to existing conditions. The analysis for Alternative 2 indicates that 195 acres within 14 activity areas would have detrimental soil conditions that exceed 20 percent of the unit area following subsoiling mitigation. All 14 of these activity areas would result in a 1-6 percent net improvement in soil quality relative to existing conditions. Neither Regional policy nor Deschutes LRMP management direction precludes management activities from occurring even though detrimental soil conditions may exceed 20 percent of an activity area. The project would not cause an activity area to move from a detrimental soil condition less than 20 percent to one that is greater than 20 percent; nor would the project increase detrimental soil conditions in activity areas that currently exceed 20 percent of the unit area (EA, page 184).

The soils analysis for the Lava Cast project fully analyzed all past actions, including timber management activities, and identified current levels of detrimental soil conditions within each of the proposed activity areas (EA, pages 136-139, 152-153, and Appendix D).

Research studies on the Deschutes National Forest have shown that the composition and distributions of soil biota populations rebound back toward pre-impact conditions following subsoiling treatments on compacted skid trails and log landings (EA, page 150).

None of the proposed activity areas overlap landtypes that contain soils with high erosion hazards (EA, page 156). Surface erosion by water is generally not a concern because dominant landtypes have gentle slopes and low-to-moderate erosion hazard ratings (EA, page 135).

Comment: ***The EA fails to properly assess the impacts on soil in conjunction with the other impacts of the project including the construction of 32 miles of temporary roads and extensive skid areas, or to adequately assess the preexisting damage to soils from grazing, wildfires, or previous timber sales. Building 32 miles of new temporary roads for this project will reverse much of the restorative benefits, expand the use of OHVs, disturb wildlife, spread weeds, disturb soils, and increase ignition risks.*** (3 - 17)

Response: The environmental consequences of the alternatives, including cumulative effects, are discussed at length on pages 136 to 162 in the EA. The cumulative detrimental effects for existing conditions and the predicted effects from project implementation (including soil restoration activities) are summarized in Table 3-32 (EA, p. 152). Appendix D of the EA displays quantitative, unit-specific information that shows the predicted amounts of detrimental soil conditions before and after implementation of project activities proposed under both action alternatives. The acres and percentages of existing soil impacts associated with roads, logging facilities, and other management facilities are

shown in Column 4 of Tables D-1 and D-2 (EA, Appendix D). The existing condition of the soil resource has mainly been influenced by the transportation system and ground-base logging facilities which were used for past timber harvest and yarding activities. The extent of detrimentally disturbed soil associated with other land uses is relatively minor in comparison (EA, page 140). The analysis indicates that the extent of detrimental soil conditions relative to existing conditions would either: 1) remain the same, 2) increase, but remain within the LRMP standard, or 3) decrease levels below existing conditions (EA, pages 152 to 154, and 184).

The effects of temporary roads on the soil resource are discussed on pages 144-146 and 151-152 the EA. Issues associated with other resource values are addressed in separate responses to comments. All temporary roads and some of the primary skid trails and log landings would be obliterated by subsoiling following vegetation management activities within specific EA units (EA, pages 41 and 148). Therefore, disturbed area estimates for temporary roads are balanced by soil restoration treatments which are designed to improve soil quality by reclaiming and stabilizing compacted road surfaces (EA, page 151). Monitoring of past subsoiling activities on the Deschutes National Forest has shown that these treatments are highly effective in restoring soil functions by fracturing compacted soil layers and increasing porosity within soil profiles (EA, pages 148-150, and 160).

Comment: ***The new EIS must also incorporate and disclose scientific research recommending restoring and protecting soil resiliency and moisture retention as a basic tenet essential to reducing the risk of severe fires in forest ecosystems.*** (3 - 18)

Response: Various references and Forest Service Manual direction were used as guidance to determine project design and mitigation needs for the soil resource. These information sources are based on the best available technical data, past monitoring of similar activities on volcanic ash soils, LRMP management direction, and nationally and regionally approved soil quality standards and guidelines. Appropriate mitigation and resource protection measures would be applied under both action alternatives to effectively limit the extent of soil disturbance and reduce the potential for on-site loss of soil productivity (EA, pages 39-41, 159 – 160, and 183).

Research studies and local soil monitoring have shown that compacted sites on volcanic ash soils can be effectively mitigated by tillage with a self-drafting winged subsoiler (Powers, 1999, Craigg, 2000). Subsoiled areas on this forest are expected to reach full recovery within the short-term (less than 5 years). These soil restoration treatments provide favorable soil physical conditions that improve the soils ability to supply nutrients, moisture, and air that support vegetative growth and biotic habitat (EA, pages 148–150, and 158). Research studies on the Deschutes National Forest have shown that the composition and distributions of soil biota populations rebound back toward pre-impact conditions following subsoiling treatments on compacted skid trails and log landings (Moldenke et al., 2000).

Research studies were also used to develop conservative recommendations that address adequate retention of coarse woody debris (CWD) following management activities (Graham et al. 1994, Brown et al. 2003). The levels of CWD retention to meet wildlife habitat objectives (Eastside Screens direction) would also meet objectives for maintaining soil productivity (EA, page 157).

Comment: ***Building 32 miles of new temporary roads for this project will reverse much of the restorative benefits, . . .*** (1 - 1)

Response: Upon completion of post harvest activities, all temporary road segments would be subsoiled (obliterated) to rehabilitate disturbed soils on compacted road surfaces (EA, pages 144-145). Monitoring of past subsoiling activities on the Deschutes National Forest has shown that these treatments are highly effective in restoring soil functions by fracturing compacted soil layers and increasing porosity within soil profiles (EA, pages 148-150) and 160. Both action alternatives would result in fewer activity areas with detrimental soil conditions that exceed the LRMP standard when compared to existing conditions (EA, page 152, Table 3-32).

Comment: ***If using techniques such as whole tree yarding or yarding with tops attached to control fuels, the agency should top a portion of the trees and leave the greens in the forest in order to retain nutrients on site.*** (1 - 34)

Response: The EA (page 157) acknowledged that mechanized whole-tree yarding would reduce potential sources of future woody materials that provide ground cover protection and a source of nutrients on treated sites. However, it is expected that sufficient sources of coarse woody debris (greater than 3 inches in diameter) would be available after mechanical thinning activities to meet recommended guidelines for wildlife habitat and soil productivity objectives.

Comment: ***Retain and protect under-represented species of conifer and non-conifer trees and shrubs. Retain patches of dense young stands as wildlife cover. . .*** (1 - 27)

Response: EA pages 83-95 analyze the effects of the alternatives on forest habitat in the late-seral and earl/mid-structural stages. As detailed on Tables 3-14 (page 83), Table 3-15 (page 87), Table 3-16 (page 90), Table 3-18 (page 92), and Table 10 (page 21 of Wildlife Report) not all of the forested habitat will be treated and there will be areas of forested habitat in a variety of structural stages remaining. Similarly, there will be a continued presence of big game hiding cover (page 109), often described as patches of dense young stands. Additionally, mitigation measures are proposed to retain patches of dense forest and address the desire to maintain aspen and willow stands. These mitigation measures are detailed on page 42 under LOS/Early and Mid Seral Habitat and Big Game. Page 111 of the EA addresses the effects to bitterbrush and big game forage.

Comment: ***Building 32 miles of new temporary roads for this project will . . .disturb wildlife, . . .*** (1 - 3)

Response: The effects of the proposed temporary road building are addressed on EA page 131. Similarly effects of roads to wildlife are analyzed on pages 82, 109-112, and 131-133.

Comment: ***ODFW prefers Alternative 3 over Alternative 2. Alternative 3 proposes treatments that would create a greater mosaic of habitat types that should benefit a suite of wildlife species where Alternative 2 tends to promote a less desirable homogenous landscape.*** (2 - 1)

Response: Alternative 3 is the preferred alternative. As stated in the comment it does provide for a greater mosaic of habitat types. This idea is brought up numerous times throughout the analysis; Early and Mid Structural Habitats (EA page 93), Big Game Habitat (page 110), Goshawk (pages 112-114), and Landbirds (EA pages 125-128), and Appendix F which should read “Comparison of Alternatives/Evaluation Criteria” as it is the table presented on pages 60 and 61 of the Wildlife Report.

Comment: ***Although the department [ODFW] supports many of the proposed treatments, we are very concerned that no actions were identified that would use treatments to close the 140 miles of trails and roads created by users (EA Recreation section/ trails) to the detriment of wildlife populations and their habitat.*** (2 - 3)

Comment: ***…there was no discussion regarding how treatments could be designed to prevent future development of undesirable user-created trails/ roads. Combining the user-created trail/ road miles with the open system road miles results in a motorized density of approximately 6 miles of open roads and trails per square mile in the Lava Cast Project area. This density significantly fragments wildlife habitat and reduces wildlife habitat effectiveness. Moreover, 6 miles per square mile of open roads and trails is many times greater than the 3.5 miles of open system roads reported in the EA, and significantly greater than the Forest Plan target of 2.5 miles per square mile. Many assessments have been conducted that emphasize how motorized roads and trails impact wildlife habitat through forest fragmentation and impact wildlife populations through undesirable energy expenditure (i.e., Interior Columbia Basin Ecosystem Management Plan). Chief Bosworth identified unmanaged recreation (off-highway vehicles (OHV)) as one of his four threats to the health of the nation's forests and grasslands. ODFW and the public identified the impact of OHVs to big game in the 2003 Mule Deer and Elk Management Plans and as a concern in the 2006 Oregon Conservation Strategy due to potential fish and wildlife impacts. During project evaluation, ODFW and Bend Fort Rock Ranger District (BFR) biologists spent field time reviewing and discussing the user-created OHV trails and roads and their impacts to wildlife (EA Management Indicator Species under All Alternatives). The PURPOSE AND NEED AND PROPOSED ACTION section of the EA states:***

"The Forest and Monument Management Plans establish desired conditions for specific resources; Management Areas and Zones within the Forest and Monument; standards and guidelines by which activities must be conducted; and general objectives for goods and services that are expected to result from these activities. . .These desired conditions, refined by actual site conditions and compared to the existing forest conditions, form the basis for the need to take action. Proposed actions are designed to promote these desired conditions. . .Changes in existing forest conditions must provide for continued suitable and sustainable wildlife habitats. "

ODFW recommends that the BFR include actions that will use vegetation treatments to close user-created trails and roads and to design treatments to minimize creation of future user-created trails and roads. (2 - 4)

Response: The LRMP Standards and Guidelines in regards to open road density refer specifically to open system roads and not a combination of roads with user-created roads and trails. The roads analysis relates specifically to Standard &Guidelines TS-12 and TS-14, and WL-53. The purpose and need, as written on pages 9 and 10 of the EA, refer specifically to historic and current forest vegetative conditions. Forest-wide designated and user-created trails/roads are part of a larger environmental analysis currently ongoing that will overlap implementation of this project (a map is projected to be released in 2009).

Off-Highway Vehicle (OHV) use and the effects of non-system roads are not only analyzed as part of the baseline or existing condition of the habitat but also as part of the cumulative effects analyses in the Big Game and Goshawk sections. There is a mitigation measure in EA (page 43) that specifically addresses a non-system road, and road closures are part of the proposed action.

Comment: ***[See original letter for] a list of birds that exist in the project area that the EA fails to adequately address all of the possible concerns and consequences [for] if the project should move ahead. [These species are] ESA, regionally sensitive listed species, management species of concern, additional species that should be of concern with potential habitat within the project area. . . . Additional species of concern in the project area include numerous neotropical migrant birds; American Marten; Townsend's Big-eared Bat, several cavity excavator species, Flying Squirrels, several rare forest plants, and potentially rare Lepidoptera species, etc.*** (3 - 19)

Response: The following is the list of species given by the respondent. The page at which the species is discussed or referred to in the EA, the Lava Cast Wildlife Specialist Report prepared by Barbara S. Webb, Wildlife Biologist, August 31, 2006, (hereinafter referred to as the Wildlife Report) and/or Biological Evaluation of Threatened, Endangered, and Sensitive Wildlife for the Lava Cast Project, prepared by Barbara Webb, Wildlife Biologist, August 29, 2006 (hereinafter referred to as the Biological Evaluation) is given. For cases where the species habitat has been determined to not be present in the planning area, the rationale for such a determination is given.

Bald Eagle: Bald eagles have been addressed in the Biological Evaluation. The respondent notes of a pair of bald eagles that nest in the Fort Rock Valley. The Fort Rock Valley is over 15 air miles and in an entirely different watershed than the project area.

Golden Eagle: Golden eagles, an MIS species, were addressed in the Wildlife Report. It was determined that suitable habitat was not present in the project area and the rationale can be found on pages 9-10 of the Wildlife Report. The comment refers to two nests in the proximity to the project area. Proximity is not defined in the comment. There are two golden eagle nests known on the Ft. Rock portion of the Bend –Ft. Rock Ranger District. These nests are each more than 15 air miles from the project area.

Northern Goshawk: The northern goshawk, an MIS species, and the habitat utilized by this species is addressed on pages 76, 82-95, and specifically on pages 112-115 of the EA. There are mitigation measures relating to goshawks on pages 43-44 of the EA. Goshawks belong to the Genus Accipiter and are included in common group name "forest hawks". References to both the species name, common name, and the group name can be found on these pages.

Red-tailed Hawk: Red-tailed hawks, an MIS species, and their habitat are addressed on pages 77, 91-95, and specifically on 118 of the EA. Red-tailed hawk nests are incorporated into the mitigation measure on page 44 of the EA.

Cooper's Hawk/Sharp-shinned Hawk: Cooper's hawks and Sharp-shinned hawks, both MIS species, and their habitats are addressed on pages 77, 83-95, and specifically on pages 115-118 of the EA. Cooper's and Sharp-shinned hawks belong to the Genus Accipiter and are included in common group name "forest hawks". References to both the species name, common name, and the group name can be found on these pages. There are mitigation measures relating to these hawks on pages 43-44 of the EA.

Osprey: Osprey, an MIS species, is addressed on pages 79 and 119 of the EA. There are mitigation measures relating to osprey on pages 4 and 44 of the EA.

Flammulated Owl: Flammulated owls, a focal landbird species and the habitat it utilizes are addressed on pages 79, 95-106, and 125-131 of the EA. There are mitigation measures relating to flammulated owls and their habitat on pages 42-43 of the EA.

Western Screech Owl: This species is not a Region 6 threatened, endangered, sensitive, or a candidate for listing, nor is it a MIS, bird of conservation concern, a high priority shorebird, or a focal bird species. In eastern Oregon, they can be found in riparian areas with sufficiently large trees, deciduous or mixed woodlands, canyons or rimrock areas, or near human structures (Contreras and Kindschy 1996). According to Natureserve (2006) this species is "apparently secure" in the state of Oregon. It is a secondary cavity nester, utilizing cavities excavated by woodpeckers. Discussions on this type of habitat can be found on pages 95-106 of the EA.

Great Grey Owl: Great gray owls, an MIS species, were addressed in the Wildlife Report and page 79 of the EA. It was determined that suitable habitat is not present in the project area and the rationale can be found on page 10 of the Wildlife Report.
Northern Pygmy Owl/Saw-Whet Owl: These species are not a Region 6 threatened, endangered, sensitive, or candidates for listing, nor are they an MIS, bird of conservation concern, a high priority shorebird, or a focal bird species. The Northern pygmy owl occurs in a variety of forests and woodlands and can be found in large tracts of contiguous forest, or in forests fragmented by timber harvest or other types of disturbance, while the Saw-whet owl nests in a variety of forest types and age-classes (Marshall et al. 2003). Both are secondary cavity nesters, utilizing cavities excavated by woodpeckers. Discussions on this type of habitat can be found on pages 95-106 of the EA.
White-headed Woodpecker: This MIS and landbird focal species and the habitat it utilizes are addressed on pages 77, 83-106, and 125-131 of the EA. There are mitigation measures relating to woodpecker habitat and nesting on pages 41-43 of the EA.
Black-backed Woodpecker: This MIS and landbird focal species and the habitat it utilizes are addressed on pages 77, 83-91, 95-106 and 125-131 of the EA. There are mitigation measures relating to woodpecker habitat and nesting on pages 41-43 of the EA.
Northern Flicker: This MIS species is addressed on page 77 of the EA as the Common flicker. It is addressed on page 23 of the Wildlife Report. There are mitigation measures relating to woodpecker habitat and nesting on pages 41-43 of the EA.
Lewis' Woodpecker: This MIS and landbird focal species is addressed on page 77 of the EA with rationale for the determination of no habitat on page 9 of the Wildlife Report.
Williamson's Sapsucker: This MIS and landbird focal species and the habitat it utilizes are addressed on pages 77, 83-106, and 125-131 of the EA. There are mitigation measures relating to sapsucker habitat and nesting on pages 41-43 of the EA.
Hairy Woodpecker: This MIS species and the habitat it utilizes are addressed on page 77 and pages 86-91, and 95-106 of the EA. Habitat for other woodpecker species also addresses habitat for this species; this is documented on page 23 of the Wildlife Report.
Downey Woodpecker: This species is not a Region 6 threatened, endangered, sensitive, or a candidate for listing, nor is it a bird of conservation concern, a high priority shorebird, or a focal bird species. It is considered a management indicator species under the general heading of woodpecker. The downy woodpecker is found mostly at low to moderate elevations in deciduous and mixed deciduous-coniferous forests, and less often in coniferous forests (Gilligan et al. 1994). According to Natureserve (2006) this species is "apparently secure" in the state of Oregon. The Lava Cast Planning Area does not contain deciduous or mixed deciduous-coniferous forests. Dead wood habitat (e.g. snags) is addressed on pages 95-106 of the EA.
Great Blue Heron: The great blue heron is a MIS, and is addressed on page 77 of the EA and page 10 of the Wildlife Report. This bird can be found in nearly any meadow, grassland, marsh, riparian thicket, lake, river, or pond within every habitat type, including agriculture, pasture, and urban areas. Nests are commonly located in coniferous or deciduous trees, but also can be found on cliff ledges, or even on the ground in thick marsh vegetation (Csuti et al. 2001). It was determined that there was no suitable habitat for this species in the planning area.
Bufflehead: The bufflehead is a Region 6 sensitive species, and has been addressed in the Biological Evaluation. These birds typically nest at high-elevation forested lakes in the central Cascades, using cavities or artificial nest boxes in trees close to water (Gilligan et al. 1994, Marshall 1996). It was determined that there was no suitable habitat for this species in the planning area.
Pygmy Nuthatch: This landbird focal species and the habitat it utilizes are addressed on page 77, and pages 95-106, and 125-131 of the EA. There are mitigation measures relating to nuthatch habitat and nesting on pages 41-43 of the EA.
White-breasted Nuthatch: This species and the habitat it utilizes are addressed on pages 83-91, and 95-106. There are mitigation measures relating to nuthatch habitat and nesting on pages 42-44 of the EA.

Brown Creeper: This landbird focal species and the habitat it utilizes are addressed on page 77, and pages 83-91, 95-106, and 125-131 of the EA. There is a mitigation measure relating to creeper nesting on page 44 of the EA.
Hermit Thrush/Olive-sided Flycatcher: These landbird focal species and the habitat they utilize are addressed on pages 77, 83-95, and 125-131 of the EA. There are mitigation measures relating to hermit thrush nesting on page 44 of the EA.
Gray Flycatcher: This species was addressed in the Wildlife Report and on page 77 of the EA. It was determined that suitable habitat was not present in the project area and the rationale can be found on page 10 of the Wildlife Report.
Hammond's Flycatcher: The Hammond's flycatcher is strongly associated with conifer-dominated habitats (Marshal et al. 2003). Tree age may be less important than forest structure in determining habitat suitability. Gaps in and beneath the canopy provide necessary space for aerial foraging, but it selects nest sites with large overstory trees that have well-developed canopies (Sakai and Noon 1991). Although potential suitable habitat exists, this species is not listed as a Region 6 threatened, endangered, sensitive, or a candidate for listing, nor is it a MIS, bird of conservation concern, a high priority shorebird, or a focal bird species. Therefore, this species was not specifically addressed in the EA. According to Natureserve (2006) this species is "apparently secure" in the state of Oregon. Nonetheless, based on the above habitat description, effects to potential habitat were addressed on pages 83-95 of the EA, and Alternative 3, the preferred alternative, would best meet this species' habitat description.
Chipping Sparrow: This landbird focal species and the habitat it utilizes are addressed on pages 77 and 125-131 of the EA. There is a mitigation measure relating to sparrow nesting on page 44 of the EA.
Dark-eyed Junco: The dark-eyed junco is found in all forest types, from sea level to high elevation, including forested suburbs (Csuti et al. 2001). It forages and nests on or close to the ground and is associated with forest openings and patches of early seral vegetation (Mannan and Meslow 1984, Kessler and Kogut 1985). Although suitable habitat exists, this species is not listed as a Region 6 threatened, endangered, sensitive, or a candidate for listing, nor is it a MIS, bird of conservation concern, a high priority shorebird, or a focal bird species. Therefore, this species was not specifically addressed in the EA. According to Natureserve (2006) this species is "secure" in the state of Oregon.
Numerous neotropical migrant birds: This is a large group of birds. Some of the above-listed species are neotropical migrants. Some neotropical birds are listed on page 77 of the EA, page 9 of the Wildlife Report and page 5 of the Biological Evaluation. A more site-specific analysis of neotropical migrants can be found on pages 125-131 of the EA under the heading of "Landbirds". Habitat components for a variety of neotropical migratory birds are also analyzed on pages 83-95 of the EA.
American Marten: This MIS species and the habitat it utilizes are addressed on pages 77, 83-106, and 118-122 of the EA. There are mitigation measures relating to marten habitat on pages 42 and 43 of the EA.
Townsend's Big-eared Bat: This MIS species and the habitat it utilizes are addressed on EA pages 77 and pages 122-125. It is referred to in the document as the Western big-eared bat.
Several cavity excavator species: This is also a broad group of species. Woodpeckers and nuthatches fit into this category and some of these species are listed on page 77 of the EA and discussed on pages 83-91; 95-106 and 125-131 of the EA.
Flying Squirrels: This species is not addressed in the EA, Wildlife Report, or Biological Evaluation. It is not an MIS species, nor a Region 6 Threatened, Endangered, or Sensitive species. Natureserve (2006) gives this species a ranking of "apparently secure" in Oregon. It is a species that utilizes dead wood (snags and logs). Effects to snag and log availability can be found on pages 95-106 of the EA.
Lepidoptera species: This is an entire Order of animal with over 60 Families, and even more Genus and species. There are no species within this Order that are listed as Region 6 threatened, endangered, sensitive, or a candidate for listing, nor a MIS. Therefore, this Order was not specifically addressed in the EA.

Comment: ***The EA fails to disclose if any other wildlife species are also addressed by HEI formula standards, and if there may be adverse impacts to these species (mule deer, quail, grouse, etc.) from the proposed Forest Plan HEI amendment for this timber sale project. The EA also fails to disclose which - if any - wildlife species are not addressed adequately by these standards, and if any plans exist to amend the forest plan to make provisions for the viability needs of these other wildlife species.*** (3 - 47)

Response: An HEI (Habitat Effectiveness Index) formula was not used in the analysis.

Comment: ***Since the Deschutes National Forest has done insufficient surveys and monitoring of sensitive and rare species on the forest, there are almost no credible ground-truthed recent studies on which the USFS or the public can rely for decision-making about resource use and allocation. Indeed, the Terrestrial Wildlife Specialist Report and Biological Evaluation fails to disclose any surveys or survey methodology for management indicator species or species of concern. In the absence of credible site-specific project surveys the report arbitrarily and capriciously dismisses the likelihood that the area may serve as suitable and/or essential habitat, for a number of wildlife species - including dispersal, travel, foraging, nesting, refuge, and denning habitat. This deficiently founded report summarily dismisses the majority of the project area as not being "suitable" habitat for species such as Fisher and Marten. This erroneously deficient terrestrial report, and the proposed action alternatives and "analysis" based upon its inaccuracies and failure to conduct rneaningful surveys violates NEPA's most basic requirements for site-specific professional analysis and expert accuracy, . . .*** (3 - 20)

Comment: ***As had been repeatedly told to the agency before, in previous comments by our organization as well as by federal court rulings, the agency must first conduct site-specific surveys for all management indicator species and species of concern within proposed project areas to comply with the NEPA and ensure that their proposed projects will not extirpate nor adversely impact these and other wildlife species. Research has shown that the dictates of survival force wildlife species to adapt to diverse localized variations in habitat, and utilize a range of habitat types beyond documented "preferred" habitat within over-logged and poorly managed forests such as the stands within the proposed project area.*** (3 - 21)

Response: Surveys for some wildlife species and/or their habitat were conducted for this analysis (page 110). Field verification of GIS-generated maps of hiding cover was conducted by Monty Gregg, Wildlife Biologist on April/May, 2004 (page 35 of the Wildlife Report). Goshawk surveys as addressed on EA page 112 were conducted according to the protocol Woodbridge, B., G. Silovsky, and K. Austin. 1993. "Survey procedure for northern goshawk on National Forest Lands in the Pacific Northwest" for years 2001-2004 and 2006.

Other field analyses to assess existing conditions and potential effects occurred in July, 2005 and June, July, August and November, 2006.

The scope of analysis for wildlife effects as described on page 73 of the EA references the January 5, 2005 Federal Planning Rules and Regulations that finds "MIS obligations may be met by considering data and analysis relating to habitat…" (Page 1052 Federal Register/ Vol. 70 No. 3). On page 75 of the EA is also the assumption that "if appropriate habitat is available for a species, then that species occupies or could occupy the habitat". This assumption takes a conservative stance in saying that

presence of habitat assumes presence of the species and the effects are thus analyzed. The habitat analyses includes dispersal and travel Connectivity (page 78-81) and Road Analysis (page 131-133), forage, nesting, refuge, and denning habitat (see forest habitat analyses pages 83-106; and species analyses (pages 106-131). The Biological Evaluation meets all applicable rules and regulation. The Biological Evaluation details the rationale why habitat for the fisher is not present within the planning area.

Effects to marten habitat components and marten are addressed on EA pages 83-106 and 119-122. In addition Appendix F compares the alternatives for marten habitat.

Comment: ***The Forest Service existing snag habitat standards are scientifically discredited and reliance on alternatives such as DecAID is unjustified until they are subjected to NEPA and NFMA analysis.*** (1 - 15)

Comment: ***The agencies need to prepare an EIS to consider a replacement method for maintaining species and other values associated with dead wood. This is especially critical because adequate dead wood is recognized as an essential feature of healthy forests and the Forest Service has identified numerous "management indicator species" associated with dead wood habitat. This suggests the current direction of managing for 100 percent population potential levels of primary excavators may not represent the most meaningful measure of managing for cavity-nesters and that these snag levels, under certain conditions, may not be adequate for some species. Under the proposed alternative a total of 981 acres of existing dead wood will be removed, and treatment of 3425 acres will result in reduced recruitment of dead wood habitat.*** (3 - 48)

Response: The concern expressed in these comment is captured on page 95 of the EA. How DecAID was used in the analysis is explained pages 95-97.

Comment: ***Other forms of decaying wood including hollow trees, natural tree cavities, peeling bark, and dead parts of live trees, as well as fungi and mistletoe associated with wood decay, all provide resources for wildlife, and should be considered along with snags and down wood in management guidelines. The ecological roles played by wildlife associated with decaying wood extend well beyond those structures per se, and can be significant factors influencing community diversity and ecosystem processes. Rose, C.L., Marcot. B.G., Mellen, T.K., Ohmann. J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 in Wildlife-Habitat Relationships in Oregon and Washington (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001)*** (3 - 49)

Response: The paper referenced in this comment (Rose et al 2001 in Johnson, D. H. and T. A. O'Neil. OSU Press, 2001) is part of the literature cited within the DecAID analysis tool, and in fact many of the authors of this paper also author DecAID. The DecAID analysis tool was used in the Lava Cast wildlife effects analysis.

The LRMP Standard and Guidelines as amended by the Eastside Screens uses snag density as the measure. The analysis focused on the standards and guidelines, but did bring in considerations of dead and decaying wood (ex. page 102 retention of dwarf mistletoe brooms). As stated in the response to comment 1-27, not all of the forested habitat will be treated and there are some hollow trees, natural tree cavities, peeling bark, and dead parts to live trees, as well as fungi and mistletoe associated with

wood decay in these areas. Also, the treatments propose a thinning from below approach, which would favor the larger trees that would likely have these characteristics.

Comment: ***ODFW supports the vegetation treatments designed to enhance forage quantity in conjunction with road closures to reduce unnecessary energy expenditure by wildlife, particularly for pre-winter mule deer benefits.*** (2 - 2)

Response: The analysis of the atlernatives on pages 109 and 110 and pages 131-133 (for roads) shows that forage and security for big game and other wildlife species would be improved. These pages also address the effects of no action on big game habitat and security.

Comment: ***ODFW appreciates the BFR's retention of more hiding cover (34%) than the Deschutes forest plan standard (30%), yet we would prefer retention of hiding cover at a range of 40% to 45% similar to that recommended by Thomas et al (1979: 40%-60%) and Leckenby et al (1982: 45%-55%). Our rationale is based on the importance of this area as a wildlife migration corridor. Information obtained from the Oregon Department of Transportation (ODOT) (Map ;see original response) indicates the Lava Cast project area is an important mule deer migration corridor. ODOT information validates track count data collected for Deschutes County from 1978 to 2001 that shows the importance of this east west corridor as a high use migration area. The Bureau of Land Management (BLM) in its 1988 Brothers/ La Pine Resource Management Plan and more recently in its 2005 Upper Deschutes Resource Management Plan (Map 2; see original response) also recognized this corridor as a high use mule deer migration area. ODFW and other agencies (ODOT, BLM, FS) have looked at this general area as a key wildlife movement corridor, since it is a fairly continuous band of public land east-west (primarily from Forest Road 42 to just south of the State Recreation Road), and due to the high mule deer track count data for this area. A wildlife overpass across Highway 97 could be built in this area if the ongoing ODFW mule deer telemetry study validates the area as a high use migration corridor. Another area from Forest Road 40 to Lava Butte has also been identified as a potential key wildlife migration corridor that again has good track count data and a near continuous east-west band of public land. The Oregon Conservation Strategy identifies barriers to fish and wildlife movement as one of the Six Key Conservation Issues (Chapter 1, page 7 road barriers).*** (2 - 6)

Comment: ***ODFW recommends that the BFR retain adequate cover strategically placed to serve as wildlife migration corridors throughout the planning area with particular emphasis along the northern edge and southern third of the project.*** (2 - 7)

Response: Figure 3-4 on page 85 of the EA shows the placement of the connectivity corridors designated in this analysis in accordance with the Eastside Screens. This map also shows the areas that are not being treated. These areas and the designated corridors are forested and found in the northern and southern portions of the planning area, and provide east-west linkages for a variety of animal species. Pages 80-82 contain the effects analysis of connectivity of habitat, dispersal, and movement of wildlife. This concern is also addressed in the mitigation measure (page 42) to retain 10% patches within units to provide some horizontal diversity and hiding cover. Also many of the monitoring items on pages 48-49 can also monitor habitat conditions post-treatment. For example Monitoring Item 5 addresses the development (size and placement) of clumps and their cover effectiveness.

Comment: ***Under the Lava Cast Project EA all action alternatives would remove canopy and hiding cover and reduce the Habitat Effectiveness Index for elk and deer in the project area, decreasing habitat quality by reducing "satisfactory cover to marginal cover and some of the marginal cover to forage." This area is already in violation of Forest Plan standards and the proposed logging would require the FS to issue a Forest Plan amendment to lower those standards yet further. It is unclear how the Forest Service can propose to remove more cover in an area that is currently violating LRMP standards for cover, and thus in violation of NFMA' s requirement that projects meet Forest Plan standards. 16 U.S.C. § 1604(i); 36 C.F.R. § 219.10(e). The agency has decided to remedy to this situation-not by conducting restoration work aimed at increasing forest cover, nor by removing excessive roads which riddle the area and expose wildlife to additional risks of harm, or by prohibiting timber sales within the area until it can meet or exceed minimum forest plan HEI standards-instead the agency proposes to write away their HEI standards, which could otherwise impede their plans to log this area, and issue an amendment excepting the project area winter range area from compliance with these standards.*** (3 - 46)

Response: Under the Big Game portion of the analysis, the LRMP Standard and Guidelines were used. There is no Forest Plan HEI Amendment, nor any amendment proposed relating to cover. Contrary to the LRMP Standards and Guidelines being violated for cover, as displayed in the analysis on pages 106-112, the existing cover is above Standard and Guidelines and will remain above post-treatment.

Comment: ***Among concerns is that of this proposed project's potential effect on lynx, especially lynx traversing the area moving towards new habitat. There have been sightings of lynx in the Cascade Mountains region. Historic evidence of lynx in these areas include positive occurrence records, lynx bounty claims, and Forest Service Wildlife Statistical Reports. Positive reports of lynx occur as far south as Modoc County, California. As such, it is reasonable to assume that lynx could occasionally occur in the project area, and did occur within the area historically. As such, then the project area is likely important to lynx recovery.*** (3 - 34)

Comment: ***The USFS should have addressed how further fragmentation of the planning area will affect lynx. It is clear that lynx habitat is very fragmented, and that large blocks of intact forest are required to maintain viable populations of the species. Without these large blocks, lynx may need larger ranges to survive. The proposed logging in the planning area will adversely affect whatever lynx recovery is occurring, as lynx may use portions of this area for both nocturnal foraging as well as migratory and dispersal routes and refuge.*** (3 - 35)

Comment: ***Continuing to squeeze lynx out of their habitat range by intensively managing the land runs afoul of NFMA's requirement that the agency maintain viable populations of wildlife that are well distributed across the landscape. 36 C.F.R. § 219.19. The USFS has an obligation to accurately assess the impacts of its project on lynx.*** (3 - 36)

Comment: ***. . . it is clear that data is lacking on the food habits of lynx in Oregon's forests, which represents a critical research need. Ruggiero, 1999b; Aubry, 1999. It is well accepted that lynx are dependant on snowshoe hares as a prey base, but in the southern portions of lynx range, squirrels, other rabbits, small rodents, birds and other wildlife may always be an important part of lynx diet. It is critical to understanding how this project may impact lynx [and] to examine how it will impact lynx prey.*** (3 - 37)

Comment: ***Snowshoe hares, squirrels, and other mamnlals have different habitat needs, but many of these species could be negatively impacted by the fragmentation, logging, road building, and other actions associated with this project. Most of these prey species require adecluate cover (USFWS,***

1999). Especially conifer cover in winter (GTR-RM-254), and foliage that is accessible during winter snowpack conditions. Hares, squirrels, and forest-dependent species are typically associated with dense forest cover, including shrubs and "dog hair" thickets of small trees. McKelevey. 1999a. Many of these prey species also perform important roles in the recovery of forest habitat, helping to spread seeds of forest plants and trees, distributing nutrients throughout area soils, and loosening compacted soil areas-none of which was disclosed or addressed in the EA. (3 - 38)

Comment: *Edge areas within and adjacent to overlogged forests provide viable habitat for many species, including potential prey species for lynx. The project's unroaded areas also provide potential habitat, and constructing new "temporary roads" into these areas will further degrade available habitat. The project area may serve as a dispersal and migration area, as well as supplemental habitat for lynx which may occur within, or traverse through, the project area.* (3 - 39)

Comment: *The proposed action alternatives which would excessively thin essential forest habitat, resulting in significantly further reducing cover for wildlife, jeopardizes both lynx and their prey species variability across the area - and thus violates the NEPA, NFMA, and the ESA. Failure to adequately address these issues in the EA violates the NEPA.* (3 - 40)

Comment: *Squirrels have different habitat needs than snowshoe hares and are associated with mature, cone-producing forests. Ruggiero, 1999a; Buskirk, 1999b; McKelvey, 1999a. They tend to reach their highest densities in late-successional, closed-canopy forests with substantial quantities of course woody debris. The EA fails to address potential impacts this project may have on squirrels, and ignores an important component of lynx diet.* (3 - 41)

Comment: *The EA failed to provide a thorough examination of how the project will impact prey species including and in addition to hares and squirrels, as well as other wildlife species that are potential lynx prey. Without complete analysis of how these prey species will be impacted, it is impossible to quantify and qualify the impacts to lynx. The EA should analyze the cumulative impacts of this project on lynz prey in association with other projects on the Districts, Forest, and surrounding lands.* (3 - 42)

Comment: **. . .** *The Lynx Conservation Assessment and Strategy (LCAS) clearly asks that the Forest Service perform project specific analysis for each project. . . The The LCAS executive summary states:*

"Plans that incorporate the conservation measures, and projects that implement them, are not generally expected to have adverse effects on lynx . . .. However, because it is impossible to provide standards and guidelines that will address all possible actions, in all locations across the broad range of the lynx, project specific analysis must be completed."

It is clear that the Forest Service has not completed such analysis and therefore is in violation of the LCAS, as well as the ESA and NFMA. Thus far the agency has failed to supply consultation agencies, in particular the FWS, with the necessary information to make a comprehensive determination regarding this proposed project's impacts to lynx and other listed species, rendering any potential FWS's "signing off" on this proposed project not in compliance with federal laws, and thus illegal. (3 - 43)

Comment: **. . .** *The agency's BE conclusions failed entirely to address potential current or historical lynx occurrence in this area. In the absence of this information, neither the public nor the decision maker has the necessary information to evaluate if the project will have unacceptable impacts, direct, indirect or cumulative effects to the Canada lynx.* (3 - 44)

Comment: ***The EA fails to disclose how this determination to ignore lynx was arrived at, and fails to disclose surveys or survey protocol, methodology, areas or frequency substantiating that surveys have been conducted that clearly indicate lynx are not an issue in the project area - even though it is known they are in the region. As such, the EA is arbitrary and capricious and therefore illegal. The EA must be withdrawn and new EIS conducted which addresses and corrects glaring deficiencies and illegalities.*** (3 - 45)

Response: In a letter to all District Wildlife Biologists on the Deschutes an Ochoco National Forest[s] and the Crooked River National Grassland (File code 2670; June 18, 2003) from Shane Jeffries and Dave Zalunardo, Forest Wildlife Biologists for the Deschutes and Ochoco National Forest (respectively) and referred to on page 75 of the EA, a determination was made that no lynx habitat or self-maintaining populations are present on these three administrative units. The rationale included using the best available science and guidance, that was often more recent than the literature referred to in the comments, and field surveys conducted on these units in 1999, 2000, and 2001. The authors of the letter relied upon the Lynx Biology Team's definitions of habitat and definitions that are part of the Lynx Conservation Assessment and Strategy. The US Fish and Wildlife Service was an integral part of both the Biology Team and the Conservation Assessment and Strategy. The letter with the rationale and literature cited can be found in the project files.

On November 8, 2006 the US FWS issued a news release announcing that critical habitat for the Canada lynx has been designated. There is no critical habitat designated in Oregon.

Comment: ***Avoid impacts to raptor nests and enhance habitat for diverse prey species. Train marking crews and cutting crews to look up and avoid cutting trees with nests of any sort and trees with defects.*** (1 - 35)

Comment: ***We have several concerns regarding Northern Goshawk. It is known that Goshawks have historically utilized the forests of the proposed project and surrounding areas for nesting, fledgling, and foraging. It is also known that Goshawks, similarly to many predatory species, rotate their nesting and foraging territories over time, so as to not deplete their prey species populations and thus maintain their viability over the long-term. As such, to ascertain potential Goshawk use, agency surveys must be conducted seasonally each year to determine the rotational patterns of Goshawks for the Lava Cast and adjacent area forests. Goshawks also have an extensive foraging territory. A total of 3332 acres of known goshawk habitat are to be treated with commercial thinning. Due to inadequate surveys, and the propensity of goshawks and other species to be forced to extend their foraging territories further in over-logged forests, this project could degrade additional areas currently being utilized by goshawks.*** (3 - 23)

Comment: ***The EA fails to address impacts to this species [goshawks] such as how logging removal of remaining canopy cover, and further fragmentation of the area's forests, will affect adult and juvenile Goshawks, or other direct, indirect, or cumulative effects to the species.*** (3 - 24)

Response: Pages 112-115 of the EA specifically address effects to goshawks. Other sections that also address goshawk habitat and effects include pages 83-95. Appendix F of the EA summarizes and compares the effects to goshawks. Mitigation measures found on pages 43-44 address protection of known and any newly discovered nests.

Comment: ***There is not sufficient analysis in the EA of the effects of the proposed project on American marten in the planning area. The forests of the Deschutes area have historically provided marten habitat. It is likely that some of these areas may still provide marten habitat-both for denning and foraging, as well as dispersal and travel corridors. The agency has an obligation under NEPA to assess the direct, indirect, and cumulative irnpacts to all species that will be affected by the proposed action. 40 C.F.R. §§ 1502.16. The Forest Service also has an obligation to obtain missing information or state why it could not be obtained if that information is necessary to make an informed decision. Id. § 1502.22. Finally, the agency has a duty to prepare a new EIS when there are unknown risks to the environment-and its current EA is deficient in addressing these issues. Id. § 1508.27.*** (3 - 31)

Comment: ***The Lava Cast timber sale will, at a minimum, adversely impact 141 acres of potential marten denning habitat, removing forest and downed wood cover, and grapple piling within this and other areas. As adequate recent surveys have not been conducted, the new EIS must address this significant issue, disclosing the results, methodology, and timeline for new surveys for marten and other wildlife species in and adjacent to the project area.*** (3 - 32)

Comment: ***In this case, the Forest Service failed to accurately and adequately assess how the proposed timber sale will impact marten. The Deschutes NF clearly is not meeting the requirements of NEPA and NFMA as they apply to pine marten, and must conduct new analysis to rectify this, including site-specific project area surveys. The new EIS must develop alternatives that protect and restore current and potential marten habitat.*** (3 - 33)

Response: In conjunction with the Scope of Analysis (page 74 of the EA), the presence of potential marten habitat assumes presence of the species. An analysis of the effects to marten can be found on pages 119-122 of the EA. This analysis includes a description of marten habitat based on scientific studies of where they were found, and more site-specific habitat information and sightings for the Deschutes National Forest. Effects to marten habitat are also addressed in the effects discussions on pages 83-106, and summarized in Appendix F of the EA. Mitigation measures referring to the habitat component of downed logs can be found on pages 41 and 42 of the EA. Specific monitoring items relating to the potential effects of treatment on the downed log component of marten habitat can be found on pages 48 and 49 of the EA.

Also, Alternative 3 modified would not have any commercial harvest on 141 acres to preserve pine marten habitat (also please see response to 1-22).

Comment: ***Neo-tropical migrant and native forest-dependent birds (as well as numerous other forest species) are in serious decades-long population declines due to the adverse cumulative impacts from over a century of commercial logging in Oregon (see "Avian Population Trends" by Brian Sharp). The EA for this proposed project fails to fully and adequately disclose the current population status and trends of native forest dependent Neotropical migrant and native avian species within the project analysis area and adjacent forest. Compliance with both the NFMA and the MBTA requires that all alternatives presented within the EA must be capable of protecting forest habitat for these many native forest species, and of reversing any current downward population trends. Such a course of proactive protective action is also required by the ESA and the NEPA, Presidential and USFS directives, and the Migratory Bird treaty Act, as well as credible conservation science and ethical integrity. However, in violation of these legal and ethical requirements, the EA presents action alternatives which would imperil neotropical and native avian species populations utilizing the project area, resulting in both individual mortality to these species as well as irreparable harm to already impaired habitat.*** (3 - 25)

Comment: ***The proposed timber sale would significantly impact migratory birds in violation of the Migratory Bird Treaty Act, 16 U.S.C. §§ 703-712 (1994). It is well known amongst the conservation-science community that many migratory birds which are currently experiencing severe population decline trends are "strongly associated" with forested habitat, and this has also been noted in other timber sale environmental documents.*** (3 - 26)

Comment: ***The proposed commercial logging would likely directly kill nesting and fledling migratory birds.*** (3 - 27)

Comment: ***The proposed logging would further seriously reduce existing forest-dependent migratory bird habitat, which has already been significantly diminished due to the cumulative impacts of past management in the area.*** (3 - 28)

Comment: ***The proposed logging "units" would also irreparably fragment migratory bird habitat. Areas that were not logged would also be negatively impacted by generalist bird species favored by the environmental conditions created in highly fragmented logged-over forests. The impact these abundant and highly competitive bird species would have on sensitive bird species dependent on natural forest ecology and less fragmented forests should have been sufficiently disclosed and evaluated in the EA.*** (3 - 29)

Comment: ***The adverse impacts that the proposed logging would have on migratory birds are supported by multiple scientific studies. The new EIS must address the above issues [Comments #3-25 through #3-29], and present alternatives designed to protect neotropical and native resident bird species, including prohibitions against thinning and other disturbances during nesting and fledging seasons.*** (3 - 30)

Response: The Introduction to the Wildlife section (EA page 74) gives a summary of the 3-27, 3-26, 3-30 legislation (Executive Order 131186), and strategies (Altman, 2000, a regional Partners in Flight publication) used to address effects to migratory birds (a.k.a. landbirds) and their decline nationwide as well as region-wide. The Introduction on page 3 of the Wildlife Report further includes the publication (USFWS Birds of Conservation Concern, 2002) regarding migratory birds and explains how all of the documents address these species. "Avian Population Trends in the Pacific Northwest" by Brian Sharp (1996; Bird Populations 3:26-45, The Institute for Bird Populations) is an article that utilizes Breeding Bird Survey data from 1968-1994 and discusses the probable causes of these trends. This document uses data that pre-dates the implementation of the Northwest Forest Plan and, specific to the Lava Cast area, the Eastside Screens Amendment. Sharp's document also pre-dates the Executive Order, the Landbird strategy adopted by the Deschutes National Forest, and the USFWS publication.

Page 77 of the EA lists the wildlife species considered in the analysis. Incorporated by reference into the EA is the rationale why a particular species habitat is not considered present or why further specific discussion of a species was not included. Among this list of species are many migratory and resident bird species. This list also includes a column revealing the Natureserve ranking that is explained on pages 3 and 4 of the Wildlife Report. As explained on these pages, this ranking addresses the current population trend of a particular species. Furthermore, species listed within respondent's letter are addressed as part of this response effort.

In the analysis, migratory birds are specifically addressed on pages 125-131 of the EA. Habitat components for a variety of landbirds are also analyzed on pages 83-95 of the EA. Competing generalist species is also brought up on page 130 of EA. In the analysis it is noted that the action alternatives would likely have different effects to different bird species. For example, pages 128-130

discuss the differences of the effects of the alternatives on habitat used by the hermit thrush. The Wildlife Report, Appendix A addresses the USFWS list of Birds of Conservation Concern. Mitigation measures specific to landbirds are proposed on pages 44 of the EA, while it is noted that mitigation measures for other habitat components are also listed on pages 42-43 of the EA.

In a recent article published in the summer 2006 issue of Bird Conservation (The Magazine of American Bird Conservancy), it reports on the top 20 most threatened bird habitats in the United States. Ponderosa pine was ranked #17, and within the discussion for this habitat type, the efforts described as restoring this habitat mirror those proposed in the action alternatives; especially Alternative 3, the preferred alternative, that applies a variable density thinning.

Comment: ***Building 32 miles of new temporary roads for this project will . . .spread weeds, . . .*** (1 - 4)

Comment: ***Take proactive steps to avoid the spread of weeds. Avoid and minimize soil disturbance. Use canopy cover and native ground cover to suppress weeds.*** (1 - 36)

Response: It is possible that road building could spread or introduce weeds. A mitigation measure to "clean equipment prior to project entry" (EA p. 39) is now routinely put into all timber sale contracts. Also, the other mitigation measure requires that equipment operating in those units adjacent to Highway 97 and Forest Road 40 (which both are known weeds sites), not operate within 75' of Hwy 97 and not enter the units through the road shoulders but via existing forest roads. In addition, monitoring (p. 49) of these subsoiled roads for weed introductions would occur.

The use of native vegetation and canopy cover is a good idea but those conditions are difficult to find in the HRV conditions the project is proposing to move towards (i.e. relatively open ponderosa pine plant associations). The ponderosa pine plant association, does not offer high enough cover to be effective. Most of the weed populations are along roads, where the shoulders are kept fairly vegetation-free for public safety reasons. Also, the relatively open nature of the natural ground-level vegetation that occurs in ponderosa plant associations precludes a strong defense against weeds, in particular, Dalmatian toadflax. There are numerous toadflax populations that occur well away from roads, in undisturbed pine forest, near Bend.

Comment: ***Building 32 miles of new temporary roads for this project will . . . Expand the use of OHVs . .*** (1 - 2)

Response: There are no restrictions or closures for OHVs in the Lava Cast area at this time. Currently, non-street legal OHVs may operate on any open road, including temporary roads, which are not maintained for passenger cars. On the Deschutes and Ochoco National Forests, these roads generally have route markers with vertical numbers. Cross country travel is not restricted at this time in the Lava Cast area. Both motorized and non-motorized recreationists can access cross country at this time. Though the construction of temporary roads may provide easier access to the areas they enter, it would not increase the opportunity for recreationists to utilize these same areas since cross-country travel is not restricted.

Comment: ***Many of the forest planning units identified for commercial harvest are located along HWY97 and major forest roads within the Lava Cast planning area. The EA talks to using an***

architect to help preserve scenic values. These commercial cutting operations effectively repeat those proposed in the 2004 scoping letter. The Juniper Group opposes the aggressive removal of trees to enhance scenic views and the creation of park-like stands. We do support removal of vegetation that complies with highway corridor safety standards. The gross removal of trees to enhance traveler views makes no sense. Specifically we recommend that treatments of all forest planning units along Highway 97 address only wildfire risk reduction, existing mistletoe infections, and existing rnountain pine beetle infestations - incorporating relevant ecological scientific research as the basis for proposed treatments. (3 - 15)

Response: The units for the Lava Cast project were primarily selected for treatment to move them towards HRV in the ponderosa pine and mixed conifer dry plant association which were historically dominated by ponderosa pine (EA p. 53). This includes meeting other criteria to meet HRV, such as stocking and disease levels. The mitigation measures identified for scenic resources (pgs. 44 & 45) are to meet Forest Plan standard and guides, not to enhance scenic views.

Appendix H

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