United States
Department of
Agriculture

Forest
Service

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# Draft Environmental Impact Statement

## and Forest Plan Amendments

## Rim-Paunina Project

**Crescent Ranger District, Deschutes National Forest**
**Klamath County, Oregon**

Townships 25, 26 South and Ranges 7, 8, 9 East
Willamette Meridian

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# Rim-Paunina Project
# Draft Environmental Impact Statement
# Klamath County, Oregon

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**Abstract:** The Forest Service has analyzed vegetation management activities in the 40,000-acre Rim-Paunina Project area on the Crescent Ranger District of the Deschutes National Forest. The purpose and need of the project is to decrease the density of trees, providing a variety of stand structures and compositions appropriate to the biophysical environment in order to increase resilience and provide habitat for a variety of species (flora and fauna). The project would also contribute to the local and regional economies by providing timber and other wood fiber products. The proposed action (Alternative B) involves commercial thinning and improvement cutting of approximately 12,000 acres, prescribed burning of approximately 8,500 acres, and construction of 9.2 miles of temporary roads. It would make available to the local economy approximately 19.9 Million Board Feet (MMBF) of timber. Three action alternatives to the proposed action (Alternatives C, D and E) were developed. Alternative C was developed to respond to the needs of selected Management Indicator Species, retaining some dense ponderosa pine stands and some decadent lodgepole pine stands. It would reduce the amount of commercial harvest to approximately 9,800 acres and increase the application of prescribed fire to approximately 12,750 acres, producing approximately 15.3 MMBF of timber and constructing 6.5 miles of temporary roads.

Alternatives D and E were developed to respond to the need to address severely mistletoe-infected pine stands across the project area, which inhibit the development of Late and Old Structure (LOS) conditions. Alternative D would create 2-5 acre gaps across approximately 2,600 acres of mistletoe-infected areas in which all trees, regardless of size, are removed in an effort to prevent the spread of mistletoe. Alternative E would remove all mistletoe-infected trees under 21 inches in diameter across approximately 1,900 acres of the most severely infected stands; however, trees over 21 inches would be retained on site. Alternative D would commercially harvest approximately 9,800 acres, apply prescribed fire to approximately 12,750 acres, produce approximately 25.3 MMBF of timber and build 6.5 miles of temporary roads. Alternative E would commercially harvest approximately 11,200 acres, apply prescribed fire to approximately 13,490 acres, produce approximately 24.1 MMBF of timber and build 8.3 miles of temporary roads.

All action alternatives would restore temporary roads back to proper hydrologic function. All alternatives considered in this environmental impact statement are consistent with applicable local, state, and national laws and regulations and with all land management plans. **Alternative E is the preferred alternative.**

**Public Comment:** This comment period is intended to provide those interested in or affected by this activity an opportunity to make their concerns known. Those who participate and provide timely comments would be eligible to appeal the decision pursuant to 36 CFR part 215 regulations.

**How to Comment and Timeframe:** Written, facsimile, hand-delivered, oral, and electronic comments concerning this action would be accepted for 45 calendar days following the EPA notice of availability being published in the *Federal Register*. The publication date in the Federal Register is the exclusive means for calculating the comment period for this proposal. Those wishing to comment should not rely upon dates or timeframe information provided by any other source. The Regulations prohibit extending the length of the comment period.

Written comments must be submitted to: Holly Jewkes, Crescent Ranger District, P.O. Box 208, Crescent, OR 97733. The office business hours for those submitting hand-delivered comments are 7:45 A.M. to 4:30 P.M. Monday through Friday, excluding holidays. Oral comments must be provided at the Responsible Official's office during normal business hours via telephone (541) 433-3200 or in person. Electronic comments must be submitted in a format such as an email message, plain text (.txt), rich text format (.rtf), or Word (.doc). If no identifiable name is attached to a comment, a verification of identity would be required for appeal eligibility. Send comments to: comments-pacificnorthwest-deschutes-crescent@fs.fed.us. In cases using an electronic message, a scanned signature is one way to provide verification. Emails submitted to email addresses other than the one listed above, in other formats than those listed, or containing viruses would be rejected.

It is the responsibility of persons providing comments to submit them by the close of the comment period and ensure that their comments have been received. Individuals and organizations wishing to be eligible to appeal must meet the information requirements of 36 CFR 215.6.

**Contact Persons**
For additional information concerning the specific activities authorized with the decision, you may contact: Tim Foley, Interdisciplinary Team Leader, at the Crescent Ranger District, P.O. Box 208, Crescent, OR 97733 @ (541) 433-3200.

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## Summary

The Crescent Ranger District on the Deschutes National Forest is proposing a project that focuses on developing and maintaining a diversity of wildlife habitats appropriate for an eastside dry forest environment. This is to be accomplished primarily through vegetation management and prescribed burning. The Rim-Paunina project area encompasses approximately 40,000 acres, lying to the south of Crescent, Oregon, in Townships 25, 26 South and Ranges 7, 8, 9 East. The entire analysis area lies within Klamath County, and is managed under direction provided in the 1990 Deschutes Land and Resource Management Plan.

In the Rim-Paunina area, the gap between the current habitat condition and what is desired is considerable. Well-intentioned management actions in the past, such as fire exclusion and salvage of insect-killed lodgepole pine, have reduced habitat diversity for Management Indicator Species in the project area, including white-headed and black-backed woodpeckers. Thus, a dual purpose and need for this project has been developed:

1. "*There is a need to decrease the density of trees to provide a variety of stand structures and compositions appropriate to the Rim-Paunina biophysical environment in order to increase resilience and provide habitat for a variety of species (flora and fauna) across the landscape now and in the future.*"

2. *There is a need to contribute to the local and regional economies by providing timber and other wood fiber products now and in the future.*

In response to these current conditions, the Forest Service proposes to treat between 12,000 and 17,000 acres (depending on alternative) to improve wildlife habitat, while also providing economic input to local communities through timber harvest. The proposal uses silvicultural treatments to provide a diversity of habitats for Management Indicator Species more in line with historical conditions to maintain and enhance existing late- and old-structured stand characteristics. It also applies prescribed fire to fire-dependent ecosystems, mimicking natural processes and creating habitat conditions for white-headed woodpecker and other wildlife species.

The public scoping letter for the Rim-Paunina Project was mailed on January 27, 2009. The Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) was published in the *Federal Register* on May 22, 2009. A field trip was held on June 3, 2009 for the public and conservation groups who were interested in an on-the-ground look and to discuss the various treatments proposed for the project area. In addition to the NOI, the Crescent District Ranger requested feedback on the alternatives in a December 1, 2009 letter updating interested stakeholders (individuals, agencies, and organizations) on the progress of the project.

Key issues drove the alternatives developed for the Rim-Paunina project, which address retaining some dense ponderosa pine stands for big game and accipiter hawk habitat (Key Issue #1), reducing mistletoe-infection (Key Issue #2), retaining decadent lodgepole pine for future black-backed woodpecker habitat (Key Issue #3), and application of prescribed fire (Key Issue #4).

These issues led the agency to develop three alternatives, in addition to the no-action and the proposed action (Alternative B). ***Alternative E is the Preferred Alternative.*** The following is a summary of the alternatives; a Comparison of Alternatives in table form is available in Chapter 2.

**Alternative A: No Action**
Under the No Action alternative, no specific management actions would be authorized as a result of this analysis. Custodial activities would continue, such as routine maintenance of roads; however, no thinning or fuels treatments would be implemented to accomplish project goals. Conditions on the ground would continue to provide inadequate habitat for a variety of wildlife species. The current overcrowding in ponderosa pine stands would continue, eventually resulting in the loss of late and old structure (LOS) conditions. Additionally, the spread of the western dwarf mistletoe disease would continue in ponderosa pine. Finally, lodgepole pine stands in the project area would remain in their current state, which lack structural complexity and do not provide adequate wildlife habitat.

**Alternative B: The Proposed Action**
The Proposed Action would use silvicultural treatments across 12,036 acres to provide a diversity of habitats for Management Indicator Species more in line with historical conditions, to maintain and enhance existing late- and old-structured stand characteristics, and encourage the development of such characteristics. It proposes approximately 6,000 acres of thinning in ponderosa pine stands to reduce density, returning the area to a more historically representative condition and improving habitat for species such as the white-headed woodpecker. It also proposes approximately 6,000 acres of improvement cutting in lodgepole pine stands with previous mountain pine beetle damage, to increase stand complexity in the long-run and provide improved habitat for species such as the black-backed woodpecker. Alternative B also includes post-treatment prescribed underburning on 8,506 acres, to achieve management objectives. Treatments are estimated to yield approximately 19.9 Million Board Feet (MMBF) of timber.

***Alternative B Connected Actions***
In order for Alternative B to be implemented, the following connected actions would need to occur:

- Approximately 9.2 miles of temporary road would need to be constructed

**Alternative C:**
Alternative C responds to Key Issue #1 by retaining some ponderosa pine stands from the proposed action in a denser, multi-layered condition for wildlife species that favor those conditions. It also responds to Key Issue #3 by retaining some decadent lodgepole pine stands to provide short-term habitat for wildlife species, including black-backed woodpecker and marten. This alternative also incorporates some additional passively-managed patches or “retention areas” greater than 15 percent in some ponderosa pine and lodgepole pine activity units. The objective is to provide more contiguous suitable habitat for a potential goshawk nest stand; nesting, roosting, foraging for black-backed woodpeckers; denning and foraging for pine marten; and hiding cover and foraging for big game.

This alternative proposes silvicultural treatment on a total of 9,792 acres, using thinning and improvement cutting prescriptions. It also responds to Key Issue #4 by proposing 12,762 acres of prescribed fire treatments on the landscape. Treatments are estimated to yield approximately 15.3 Million Board Feet (MMBF) of timber.

***Alternative C Connected Actions***
In order for Alternative C to be implemented, the following connected actions would need to occur:

- Approximately 6.5 miles of temporary road would need to be constructed

**Alternative D:**
Similar to Alternative C, Alternative D responds to Key Issue #1 by retaining some ponderosa pine stands in a denser, multi-layered condition and Key Issue #3 by retaining some decadent lodgepole pine stands. It also responds to Key Issue #2 through focused mistletoe treatments. In 2,593 acres of stands

categorized as "severely mistletoe infected", this alternative proposes to create 2-5 acre openings on 30 percent of those acres, with the other 70 percent being treated through thinning. These openings, in which all trees would be removed, would serve to give ponderosa pine seedlings a chance to grow in a relatively mistletoe-free environment

This alternative proposes silvicultural treatment on a total of 9,792 acres, using thinning, improvement cutting, and group selection prescriptions. It also responds to Key Issue #4 by proposing 12,762 acres of prescribed fire treatments on the landscape. Treatments are estimated to yield approximately 25.3 Million Board Feet (MMBF) of timber.

***Alternative D Connected Actions***
In order for Alternative D to be implemented, the following connected actions would need to occur:

- Approximately 6.5 miles of temporary road would need to be constructed

**Alternative E: The Preferred Alternative**
Alternative E responds to Key Issue #2 in a different manner than Alternative D. This alternative proposes to treat 1,921 acres of the most severely mistletoe-infected stands by removing all infected trees less than 21 inches, and accelerating the mortality of infected trees over 21 inches through prescribed fire, blasting or other means. Similar to Alternatives C and D, Alternative E also responds to Key Issue #1 by retaining some ponderosa pine stands in a denser, multi-layered condition and Key Issue #3 by retaining some decadent lodgepole pine stands, although not to the same degree as Alternatives C and D.

This alternative proposes silvicultural treatment on a total of 11,236 acres, using thinning, improvement cutting, and alternative mistletoe treatment prescriptions. It also responds to Key Issue #4 by proposing 13,490 acres of prescribed fire treatments on the landscape. Treatments are estimated to yield approximately 24.1 Million Board Feet (MMBF) of timber.

***Alternative E Connected Actions***
In order for Alternative E to be implemented, the following connected actions would need to occur:

- Approximately 8.3 miles of temporary road would need to be constructed

**Forest Plan Amendments**
There are four site-specific amendments proposed to the Deschutes National Forest Land and Resource Management Plan (Forest Plan) as part of this project:

1. In Alternative D, the project proposes a site-specific amendment to the *Interim Eastside Screens* to allow a timber sale to cut and remove trees greater than or equal to 21 inches in diameter.
2. In Alternative D, the project proposes a site-specific amendment to the *Interim Eastside Screens* to allow for a net loss of 145 acres of LOS for two biophysical environments.
3. In all Action Alternatives, the project proposes a site-specific amendment to the *Interim Eastside Screens* to allow for a timber harvest when LOS falls below the historic range of variability (HRV) in a particular biophysical environment.
4. In all Action Alternatives, the project proposes a site-specific amendment to the *Deschutes Land and Resource Management Plan* to utilize prescribed fire in larger than 5-acres blocks of Partial Retention Foreground areas of Scenic Views along Highways 58 and 97.

**Major conclusions include:**

***Wildlife***
The complexity of analysis shows that there are trade-offs when managing wildlife habitat but wildlife species are not necessarily winners if habitat is gained or losers if habitat is lost. Treatments result in a more resilient landscape, more closely resembling the historic range of variability that the species developed in and a landscape returning to a more frequent fire regime reducing risk to all habitats and in which all species benefit in the long term.

The determination in the Biological Evaluation for Threatened, Endangered, and Federal Candidate species was that implementation of this project for Alternatives B, C, D, and E would have **"No Effect"** on the northern spotted owl and northern spotted owl critical habitat. Alternatives B, C, D and E would have "**No Impact**" on the Oregon spotted frog and California wolverine. Alternatives B, C, D and E would result in a determination of **"May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species"** for the Pacific fisher.

***Forested Vegetation***
Rim-Paunina treatments are intended to address vegetative conditions that fall outside of historic range of variability (HRV), and reduce the ability of the area to support a variety of wildlife species. Treatments would address the overabundance of dense ponderosa pine stands, and would improve forest health in beetle-infested lodgepole pine stands. Mistletoe infection is widespread in the project area, and Alternative E has the highest predicted effectiveness for addressing this issue.

***Fire and Fuels***
The entire Rim-Paunina project area is within the Walker Range Community Wildfire Protection Plan. The goals of fuels reduction activities would be to reduce the undesired effects of a wildfire within the project area, and facilitate a low-intensity frequent fire regime in appropriate stands. The strategy would be a landscape approach to strategically target stands with techniques to lower the fire behavior characteristics. To this end, Alternative E would afford the greatest risk reduction on a landscape scale, due to the scope and placement of proposed activities.

***Soils***
All activities have been designed to meet Forest Plan and Regional Standards, as none of the proposed activities would lead to a detrimental soil disturbance exceeding 20 percent in any of the units. All areas where active management is to occur would continue to function as productive sites.

***Recreation***
The only developed recreation site within the project area is Boundary Springs near Walker Rim, and dispersed camping is also popular in the area. No harvest activities are planned within the Boundary Springs camping site. Additionally, the project area overlaps the planned Three Trails OHV designated trail system, and timber hauling and/or prescribed burning operations could lead to temporary trail closures. The project area also overlaps winter snowmobile routes; however, proposed seasonal restrictions on harvesting and hauling would mitigate any conflict. Impacts to the safety and enjoyment of recreation opportunities in the project area have been addressed through project design features and mitigations.

***Botany***
Of the 74 species listed on the Deschutes/Ochoco Sensitive Plants list, there are two species that have been documented within the Rim-Paunina project area: pumice grape-fern (*Botrychium pumicola*) and tomentypnum moss (*Tomentypnum nitens*). No treatment areas overlap with documented pumice grape-

fern sites and within unit 205 where tomentypnum moss has been documented, no activities are proposed in the wet meadow area where the moss has been found.

***Invasive Plants***
Based on the vectors and proposed activity, all alternatives were determined to have a high risk rating for introduction and spread of existing populations of invasive plants. Regardless of alternative, this project would use prevention as the main strategy to manage invasive plant species (R6 Invasive Plant EIS Standard #7). Actions conducted or authorized by written permit (contracts) that operate outside the limits of the road prism, require clean equipment prior to entering National Forest System Lands. All active gravel, fill, sand stockpiles, quarry sites, and borrow material will be inspected for invasive plants before use and transport. Only weed-free gravel, fill, sand, and rock would be used.

***Fisheries and Water Quality***
The determination in the Biological Evaluation was that implementation of this project would have "**No Effect**" on Bull Trout fisheries or their aquatic habitat, and **"No Impact"** on Redband Trout fisheries or their aquatic habitat.

Some activities are proposed in Riparian Habitat Conservation Areas (RHCAs) to address lodgepole encroachment and promote meadow restoration. Based on the location, timing and design of these activities, the effects would be localized and would not have any direct or indirect effects on water quality or water quantity. Mechanized equipment would be restricted to the edge of soils mapped as sensitive.

There are no State of Oregon 303(d) water bodies listed as impaired within the planning area.

***Economic and Social***
Contributing to the local and regional economies by providing timber and other wood fiber products is one of the purposes of this project. Alternative D would provide the largest volume of timber to the local economy, and as a result the largest amount of job creation. Of the action alternatives, only Alternatives D and E are projected to have a benefit-cost ratio over 1.0, generating more revenue than the costs associated with the project.

## List of Acronyms

| | |
|---|---|
| ACS - | Aquatic Conservation Strategy |
| BA - | Biological Assessment |
| BBS - | Breeding Bird Surveys |
| BCC - | Birds of Conservation Concern |
| BCR - | Bird Conservation Region |
| BE - | Biological Evaluation |
| BEMA - | Bald Eagle Management Area |
| BI - | Beneficial Impact |
| BMP - | Best Management Practices |
| BO - | Biological Opinion |
| BOR - | Bureau of Reclamation |
| CEQ- | Council on Environmental Quality |
| CFR - | Code of Federal Regulations |
| CHU- | Critical Habitat Unit |
| COHVOP | Central Oregon Combined Off-Highway Vehicle Operations |
| CSA - | Conservation Support Areas |
| CWPP - | Community Wildfire Protection Plan |
| DEQ - | Oregon Department of Environmental Quality |
| EA - | Environmental Assessment |
| EIS - | Environmental Impact Statement |
| EPA - | Environmental Protection Agency |
| ESA - | Endangered Species Act of 1973 |
| FRCC - | Fire Regime Condition Class |
| FS - | Forest Service |
| FSH - | Forest Service Handbook |
| FSM - | Forest Service Manual |
| GIS - | Geographical Information System |
| GNN - | Gradient Nearest Neighbor |
| HIM - | Harvest Improvement Cut |
| HRV - | Historic Range of Variability |
| HSG - | Harvest Group Selection |
| HTH - | Harvest Thinning Cut |
| HUC - | Hydrologic Unit Code |
| INFISH - | Inland Native Fish Strategy |
| IRA - | Inventoried Roadless Area |
| IWMP - | Deschutes National Forest Integrated Weed Management Plan |
| LAP - | Land Analysis Process |
| LOS - | Late and Old Structure |
| LRMP - | Deschutes National Forest Land and Resource Management Plan (1990) |
| LSR - | Late Successional Reserve |
| MIS - | Management Indicator Species |
| MIIH - | May Impact Individuals or Habitat but Would Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species |
| MOU - | Memorandum of Understanding |
| MSA - | Magnuson-Stevens Fishery Conservation Act |
| MSL - | Mean Sea Level |

| | |
|---|---|
| MVUM - | Motor Vehicle Use Map |
| NEPA - | National Environmental Policy Act |
| NFMA - | National Forest Management Act |
| NHPA - | National Historic Preservation Act |
| NLAA - | May Affect, but Not Likely to Adversely Affect |
| NMFS - | National Marine Fisheries Service |
| NOA - | Notice of Availability |
| NOI - | Notice of Intent |
| NWFP - | Northwest Forest Plan |
| OCRA - | Oregon Cascade Recreation Area |
| ODF - | Oregon Department of Forestry |
| ODFW - | Oregon Department of Fish and Wildlife |
| OEDC - | Oregon Environmental Quality Commission |
| OHV - | Off-Highway Vehicle |
| ORV - | Outstanding Remarkable Value |
| OSHA - | Occupational Safety and Health Association |
| PAG - | Plant Association Group |
| PDC - | Project Design Criteria from the 2006-2009 Programmatic Biological Assessment |
| PFA - | Post-Fledgling Area |
| R6 - | Region Six |
| RHCA - | Riparian Habitat Conservation Area |
| ROD - | Record of Decision |
| RR - | Riparian Reserve |
| SDI - | Stand Density Index |
| SHPO - | State Historic Preservation Office |
| TES - | Threatened, Endangered and Sensitive Species |
| TM- | Travel Management |
| TMDL - | Total Maximum Daily Load |
| USDA - | United States Department of Agriculture |
| USDI - | United States Department of the Interior |
| USFS - | United States Forest Service |
| USFWS - | United States Fish and Wildlife Service |
| VQO - | Visual Quality Objective |
| WSR- | Wild and Scenic River |
| WQMP - | Water Quality Management Plan |
| WUI - | Wildland-Urban Interface |

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# Chapter 1. Purpose of and Need for Action

## Document Structure

The Forest Service has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental effects that would result from the proposed action and alternatives. The document is organized into four chapters:

- ***Chapter 1. Purpose and Need for Action****:* This chapter includes information on the history of the project proposal, existing conditions within the analysis area, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need.
- ***Chapter 2. Alternatives, including the Proposed Action****:* This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- ***Chapter 3. Affected Environment and Environmental Consequences***: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.
- ***Chapter 4. Consultation and Coordination****:* This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- ***Index****:* The index provides page numbers by subject.
- ***Appendices****:* The appendices provide more detailed information to support the analyses presented in the environmental impact statement. Appendix A describes the management areas and consistency with current laws and management direction.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Crescent Ranger District, Crescent, Oregon.

## Background and Existing Condition

Rim-Paunina is located in the Walker Mountain area on the southern end of the Crescent Ranger District. The project focus is on developing and maintaining a diversity of wildlife habitats that are appropriate for an eastside dry forest environment. Potential actions include thinning of trees in variable densities and prescribed burning. The project included broad participation from a diverse group of stakeholders in a collaborative planning process.

The Rim-Paunina project area is approximately 40,000-acres, and bordered by the new Gilchrist State Forest to the north and the Fremont-Winema National Forests to the south and east. It is mostly comprised of ponderosa and lodgepole pine forests with some mixed conifer on Walker Rim. Well-intentioned management actions in the past, such as fire exclusion and salvage of insect-killed lodgepole pine, have reduced habitat diversity in the area for a special segment of wildlife called Management Indicator Species. These species have evolved within a condition across the landscape which developed through various disturbance processes such as low-intensity and frequent fires in ponderosa pine, and events that maintained lodgepole in a range of conditions including single story to dense and multi-story trees. The Deschutes National Forest Land and Resource Management Plan (Forest Plan) has designated them because their welfare is used as a benchmark against which other species dependent upon similar habitat conditions is measured. In the Rim-Paunina area, the Management Indicator Species of focus

would be white-headed, black-backed, and three-toed woodpeckers; accipiter hawks (small to medium low-flying and agile hawks); big game (deer and elk); and American marten.

The Forest Service acknowledges that insects, disease, or wildfire is a part of the ecology of all forests. In order to provide the habitat diversity for the various Management Indicator Species of focus, the goal was to establish conditions for an appropriate level of disturbance, based largely upon conditions for which they historically occurred, particularly in ponderosa pine. If kept in its current condition, these events have potential to remove important habitat structure, particularly large trees that are desired over the long-term.

## Purpose and Need for Action

The 1990 Deschutes National Forest Land and Resource Management Plan (Forest Plan), as amended, guides all natural resource management activities and provides standards and guidelines for the Deschutes National Forest, and in this respect, this Rim-Paunina EIS tiers to the FEIS for the Forest Plan (USDA Forest Service, 1990). The Forest Plan (Forest Plan; page 4-2) contains three Forest Management Goals that are particularly relevant to this project:

1. Maintain and enhance vigor of the forest ecosystem through the control of forest pests.
2. Provide old-growth tree stands for (1) preservation of natural genetic pools, (2) habitat for plants and wildlife species associated with over-mature tree stands, (3) contributions to the diversity spectrum, (4) aesthetic appeal.
3. Provide an optimum level of timber production consistent with various resource objectives, environmental constraints, and economic efficiency.

In the Rim-Paunina area, the gap between the current habitat condition and what is desired is considerable. Large diameter, open ponderosa pine stands which provide the most suitable habitat for the white-headed woodpecker have diminished and there is an increasing amount of smaller trees in the understory. This overcrowding and competition with the larger trees is evident now resulting in a mortality level that is expected to increase faster than large diameter trees can develop. The presence of dense understory trees and high levels of brush increase the risk of white-headed woodpecker nests being preyed upon by squirrels and chipmunks. If nothing is done, there will be substantially fewer large trees within the next two decades thus further diminishing an important habitat component for this woodpecker.

Approximately 40 percent of the project area is lodgepole pine that currently provides little habitat for the black-backed and three-toed woodpeckers and marten due to a mountain pine beetle outbreak in the 1980s. Subsequent management actions at the time extensively salvaged the dead and down trees. Much of the area currently has minimal overstory trees but has a dense layer of understory that has regenerated. Currently, stand complexity in lodgepole pine is considered low and is not providing optimum habitat for many wildlife species of focus. Utilizing management techniques to vary the tree densities, optimizing tree growth, and even passively managing (no action) in some stands would ultimately benefit target species. These actions would lead to more complex structure and historical range of conditions, benefiting species in the short- and long-term.

The project area also contains a diminishing number of aspen and other hardwood stands, a preferred habitat for Downy Woodpecker and Red-Naped Sapsucker. Historically the numerous small draws along the Walker Rim and other moist micro climates in the project area were maintained in a more open condition due to periodic fire. Aspen and other hardwood need these conditions in order to regenerate and grow. In the absence of fire, dense conifer stands have grown in these areas and have pushed out the

historical aspen and other hardwood species as well as shading out hardwood regeneration. Management is necessary to restore these areas for those species which prefer a hardwood habitat.

**Purpose and Need Statement #1:** *There is a need to decrease the density of trees to provide a variety of stand structures and compositions appropriate to the Rim-Paunina biophysical environment in order to increase resilience and provide habitat for a variety of species (flora and fauna) across the landscape now and in the future.*

The Multiple-Use Sustained Yield Act of 1960 directs the policy of National Forests to be administered for consideration for all resources. This includes goods and services that have a monetary and non-monetary value. This places natural resource managers sometimes at odds with various segments of the public that desire solely consumptive or non-consumptive (such as wildlife habitat or recreation) uses of the forest. Given that the Forest Service should place equal consideration to all resources and non-consumptive values to ensure they are weighted equally, then:

**Purpose and Need Statement #2:** *There is a need to contribute to the local and regional economies by providing timber and other wood fiber products now and in the future.*

## Proposed Action

Simply stated, the proposed action is to:

- Use silvicultural treatments to provide a diversity of habitats for Management Indicator Species more in line with historical conditions to maintain and enhance existing late- and old-structured stand characteristics, and encourage the development of such characteristics.
- Apply prescribed fire to fire-dependent ecosystems to create habitat conditions that allow fire to perform its natural ecological function and more closely mimic natural processes that maintain white-headed woodpecker habitat and other dependent wildlife species.
- Apply activities on the landscape and maintain them through time to optimize diversity and juxtaposition of habitats.
- Take advantage of opportunities resulting from vegetation management activities that offset costs and provide products to stimulate the economy.

The following table displays approximate acres of various treatments:

**Table 1. Proposed Activity and Approximate Acreage for the Rim-Paunina Project**

| Proposed Activities for Alternative B | Approximate Acres |
|---|---|
| Density reduction, or thinning, including commercial and non-commercial removal in ponderosa pine (HTH). | 6,082 |
| Improvement cutting primarily in lodgepole pine to enhance overall stand composition and quality (HIM). | 5,910 |
| Aspen Treatment | 43 |
| Disposal of activity-created slash without underburning | 3,530 |
| Disposal of activity-created slash followed by prescribed underburning | 8,506 |

## Decision Framework

The Responsible Official for this proposal is the Forest Supervisor of the Deschutes National Forest. The Responsible Official would make a decision and document it in a Record of Decision (ROD). The Responsible Official can decide to:

1. Select the proposed action, an action alternative that has been considered in detail, modify an action alternative, or select the no-action alternative.
2. Identify what Project Design Features and Mitigation Measures would apply.
3. Determine what monitoring would be necessary.
4. Amend the Forest Plan.

The Forest Supervisor would evaluate the alternatives by:

- Examining how well they meet the underlying purpose and need for action;
- Considering their responsiveness to the issues and concerns raised by the public and other agencies; and
- Reviewing their likely environmental effects.

**Figure 1. Rim-Paunina Project Area Locator Map**

# Chapter 2. Alternatives, Including the Proposed Action

## Introduction

This chapter describes public involvement and issue development that led to alternatives. It also compares the alternatives considered for the Rim-Paunina Project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice by the decision maker. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social, and economic effects of implementing each alternative.

## Public Involvement

The public scoping letter was mailed on January 27, 2009. The Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for the Rim-Paunina Project was published in the *Federal Register* on May 22, 2009. A field trip was held on June 3, 2009 for the public and conservation groups who were interested in an on-the-ground look and to discuss the various treatments proposed for the project area. In addition to the Notice of Intent (NOI), the Crescent District Ranger requested feedback on the alternatives in a December 1, 2009 letter updating interested stakeholders (individuals, agencies, and organizations) on the progress of the project.

Early in the process, a link from Central Oregon forest website was established and maintained (http://www.fs.fed.us/r6/centraloregon/projects/units/crescent/index.shtml). Table 2 illustrates the public involvement effort for the Rim-Paunina Project.

**Table 2. Public Involvement in the Rim-Paunina Planning Process**

| Date | Stakeholder | Format/Information |
|---|---|---|
| April 17, 2009 | Tribal | Letter from Holly Jewkes, Crescent District Ranger to Tribal leaders describing the Rim-Paunina project and inviting them to comment and join the collaboration group. |
| May 4, 2009 | Public | Letter to interested citizens with request to comment on Rim-Paunina Project. |
| May 19, 2009 | Public | Email with Notice of Intent to prepare an EIS for Rim-Paunina Project. |
| May 22, 2009 | All interested parties | Notice of Intent (NOI) *Federal Register* Vol. 74, No. 98 |
| May 2009 to present | Public | Meetings and field trips with stakeholders to develop a better understanding of the NEPA process and project planning. All meeting were open to the public. |

| Date | Stakeholder | Format/Information |
|---|---|---|
| June 3, 2009 | Public | Field trip with stakeholders to three sites within the Rim-Paunina Project area on the Crescent Ranger District to discuss proposed treatments. |
| December 1, 2009 | Public | Letter to interested citizens with an update on Rim-Paunina and an opportunity to comment. |

**Consultation with American Indian Tribes**
During the early stages of this project, government to government contact was made with affected tribes (Klamath, Confederated Tribes of Warm Springs, and Burns-Paiute). The proposed action was presented in a letter dated April 17, 2009 to the Tribal Chairs and their Cultural Resource Program Managers. The Klamath Tribes responded with an interest in potential disturbance to culturally important sites on Walker Rim and Little Walker Mountain. To respond to this concern Project Design Features were incorporated to buffer any known sites prior to treatment activities and if during treatment activities any cultural artifacts or features are discovered, work would be halted until an archeologist can review the site.

**Consultation with Government Agencies**
Informal consultation and correspondence has occurred with the US Fish and Wildlife Service and the Environmental Protection Agency.

Consultation has occurred with the State Historic Preservation Office (SHPO).

**Collaboration**
The development of the Rim-Paunina project was bolstered by robust collaborative participation from a diverse group of external stakeholders. This group was convened and facilitated through the Central Oregon Intergovernmental Council (COIC) acting as a third party. Collaborators ranged from forest conservation and wildlife advocates to forest products harvesting interests, and from recreation interests, to timber industry advocates. Including an initial scoping meeting, the group had nine collaborative process meetings over an 11 month period and used the National Environmental Policy Act (NEPA) public input process to weigh in on the Rim-Paunina project. All meetings were open to the public and followed Federal Advisory Committee Act guidelines, which enabled participation by the full diversity of groups interested in the well-being of the Deschutes National Forest and the resources it manages. In addition, the Forest Service was invited to participate in these meetings and helped provide the group with on-the-ground knowledge of current conditions in the project area, so the group could make more informed recommendations on the agency's proposed action.

From an agency perspective, public collaborative participation in any planning process builds a greater transparency from initial scoping to decision-making. It is also essential in achieving quality feedback and ensuring that all possible alternatives are explored before a decision is made. For the Rim-Paunina project, the dialogue within the collaborative group as well as between the group and the Forest Service helped generate key issues and develop potential solutions to tackle these issues that supported the Forest Service planning process. The diversity of perspectives and the inclusivity of the collaborative group enabled all sides of an issue to be explored. In sum, this EIS was strengthened by enthusiastic participation from a broad group of stakeholders, helping the agency best meet the dual purpose and need of the project; creating a diversity of wildlife habitats while also providing timber and other wood products to the local community.

## Issues

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

The project Interdisciplinary Team sorted the comments received during initial scoping into categories to help issue tracking and response. The issues are categorized as follows:

- **Key Issues**: These are issues that cannot be resolved without some consideration of the trade-offs involved and so are used to develop alternatives and design elements. Trade-offs can be more clearly understood by developing alternatives and displaying the relative effects of these alternatives.
- **Resources of Concern**: These are those resource values that comments identified as potentially affected by the proposed project, and which require consideration in the environmental analysis and decision. In contrast to key issues which drive alternative development, resources of concern drive the focus of analysis in Chapter 3 to explore the effects of the project on various disciplines. These are important for providing the Responsible Official with complete information about the effects of the project.

**Key Issues**

The alternatives respond to the following key issues identified during initial project scoping. The key issues are specific to the proposed actions and the analysis area. Each issue includes a measure that can help evaluate how each of the alternatives addresses the concern raised. Evaluations of each attribute and measure are provided later in this Chapter in the Comparison of Alternatives section.

***Key Issue #1*:** The proposed action strives to use silvicultural techniques and prescribed underburning to return ponderosa pine in ponderosa pine and mixed conifer plant association groups to a more open condition. This action would move landscape conditions more toward what was seen historically and tend to favor species such as the white-headed woodpecker that prefer this type of habitat. However, these treatments and resultant habitat conditions are less desirable for other species such as accipiter hawks and big game that tend to favor denser, often multi-layered stands.

- *Measure: Dense ponderosa pine stands retained as compared to the proposed action (in acres)*
- *Measure: Change in habitat over time for White-headed woodpeckers and Accipiters*
- *Measure: Change in hiding cover retained for Big Game*

***Key Issue #2*:** The proposed action recognizes the diminishing amount of suitable habitat for ponderosa pine-dependent wildlife species such as the white-headed woodpecker. However, a considerable portion of the ponderosa pine-dominated stands are heavily infected with dwarf mistletoe in all size classes. In these stands, actions described in the proposed action may only provide marginal white-headed woodpecker habitat in the short term. In the long term, mortality of the overstory trees and their replacement creates a gap-in-time that can span decades before larger trees are available.

- *Measure: Mistletoe-Infected ponderosa pine stands treated (in acres)*

***Key Issue #3*:** The proposed action would use silviculture techniques to manage lodgepole pine stands to develop future black-backed woodpecker nesting habitat, but did not provide a proper balance for short-

term and long-term conditions. Currently, some of these stands also serve as suitable habitat for the black-backed woodpecker, marten, and Big Game.

- *Measure: Decadent lodgepole stands retained as compared to the proposed action (in acres)*
- *Measure: Habitat over time for American marten and Black-backed woodpecker*

***Key Issue #4*:** The proposed action did not go far enough in the application of prescribed fire in the project area. Currently, there are several thousand acres of relatively open pine stands that are mostly single story with a brush component that is not in a desirable condition favored by the white-headed woodpecker for nesting habitat. With minimal investment, they would be in a condition for the return of a frequent fire regime for which they likely evolved.

- *Measure: Prescribed fire applied (in acres)*

**Resources of Concern**
Other issues and concerns for various resource areas were raised during scoping that did not result in different alternatives or design elements, but are considered during the analysis process and discussed in Chapter 3. These include:

- **Aquatic Resources including fish habitat**
- **Botanical Resources and Invasive Plant species**
- **Cultural Resources**
- **Forested Vegetation**
- **Potential Wilderness Inventory**
- **Public Health and Safety**
- **Recreation**
- **Scenery as it relates to Forest Plan consistency**
- **Social and Economic effects**
- **Soil and Water Quality**
- **Wildlife**

## Alternatives Considered in Detail

The Forest Service developed three alternatives to the Proposed Action, for a total of five alternatives, including the No Action, for the Rim-Paunina Project. The No Action Alternative is used as a baseline to display consequences of a passive management scenario. This section includes a description and map of each Action Alternative considered. It also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Information used to compare the alternatives is based upon the design of the alternative and on the environmental, economic, and social effects of implementing each alternative.

No activities would occur within the boundary of the Oregon Cascade Recreation Area (OCRA), designated Wilderness, or Inventoried Roadless Areas.

The Action Alternatives for this project involve a variety of vegetation management prescriptions:

***Thinning (HTH)*** – a cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality (Helms 1998).

Trees would be thinned to a density within the management zone with thought to future growth within the next 20 or 30 years before the next likely commercial treatment. This would primarily be achieved by

thinning from below – the removal of trees from the lower crown classes to favor those in the upper crown classes (Helms 1998). After thinning, stands would average as low as 20 percent canopy cover and 50 square feet of basal area in lodgepole pine and up to 40 percent canopy cover and 180 square feet of basal area in mixed conifer plant associations.

***Improvement Cutting (HIM)*** – the removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality (Helms 1998).

Improvement cutting activities are primarily proposed in lodgepole pine stands that were impacted by the mountain pine beetle outbreak of the 1980s. The proportion of their overstories that exhibit poor crowns and/or heavy mistletoe infection would be removed. These trees have poor growth rates and potential for infecting the understory with mistletoe is high. These stands would have fewer remaining overstory trees than in those stands that are thinned (HTH). The understory would contribute significantly to future growth.

***Group Selections (HSG)*** – In Alternative D, areas of high mistletoe occurrence of dwarf mistletoe are proposed for this treatment. Within a stand, two to five acres openings would be created totaling 15-30 percent of the total stand area. The remainder would be thinned. All trees infected with dwarf mistletoe would be removed from the openings and ponderosa pine would be planted. This would prevent reinfection of dwarf mistletoe from above.

***Alternate Mistletoe Treatment* (AltMist)** – All dwarf mistletoe infected trees less than 21" would be removed. Mortality of the remaining infected trees above 21" may be accelerated using techniques such as prescribed fire or blasting. The stand would be planted with ecologically appropriate trees species, primarily ponderosa pine. Where live infected ponderosa pine remain, alternate species would be planted within 30 feet of the infected tree's dripline to prevent reinfection of the understory (dwarf mistletoe generally is not transmitted between tree species).

***Aspen*** - Unit 621 is proposed for aspen treatment in all action alternatives. This is a 43 acre unit containing two small draws which, under a historical fire regime, would have had a greater hardwood component. The current condition of dense conifers has resulted in existing aspen and other hardwoods being crowded out as well as hardwood regeneration being suppressed. Treatment would consist of creating five openings of up to two acres in size, where all conifers less than 21 inches in diameter would be removed, which would facilitate the restoration of native species such as aspen and willow. Two of the openings would be located adjacent to an existing aspen patch toward the north end of the unit in order to allow it to expand. Additional openings would be placed within small draws that have a moist micro climate suitable to these species. Regeneration may also be assisted through a variety of means including prescribed fire, root cutting, or planting. Seedlings and saplings would be protected using wood, metal, or plastic fences until the crown is above the area susceptible to browse from large ungulates. Trapping of gophers may also be required. The remaining portion of the unit would be thinned following the HTH treatment guidelines.

## Alternative A

### No Action

The No Action Alternative is included as a baseline comparison of continuing the existing conditions without implementing the proposed actions as required by the CEQ Regulations (40 CFR 1502.14). The No Action/No Change Alternative would not implement any changes in the current management direction. No thinning or fuels treatments would be implemented to accomplish project goals. There would be no Forest Plan amendments to Deschutes Land and Resource Management Plan as amended by the Eastside Screens. Custodial activities would continue, such as routine maintenance of roads and

timber plantations. Response to environmental emergencies, such as suppression response to wildfire, would continue.

## Action Alternatives

**Four Forest Plan Amendments are required.**
There are four site-specific amendments to the Deschutes National Forest Land and Resource Management Plan (Forest Plan) as amended for the proposed Rim-Paunina Project on the Crescent Ranger District. Three are for the Eastside Screens, harvest of trees over 21 inches and two related to Historical Range of Variability (HRV) and Late and Old Structure (LOS) scenarios, and the fourth is for the use of prescribed fire exceeding five acres within scenic views.

1. In Alternative D, the project proposes a site-specific amendment to the *Interim Eastside Screens* to allow a timber sale to cut and remove trees greater than or equal to 21 inches in diameter.
2. In Alternative D, the project proposes a site-specific amendment to the *Interim Eastside Screens* to allow for a net loss of 145 acres of LOS for two biophysical environments.
3. In all Action Alternatives, the project proposes a site-specific amendment to the *Interim Eastside Screens* to allow for a timber harvest in LOS when LOS falls below the HRV in a particular biophysical environment.
4. In all Action Alternatives, the project proposes a site-specific amendment to the *Deschutes Land and Resource Management Plan* to allow prescribed fire in larger than 5-acre blocks of Partial Retention Foreground areas of Scenic Views, located along Highways 58 and 97.

See the Other Disclosures section in Chapter 3 for more details on Forest Plan Amendments.

## Alternative B (Proposed Action)

Alternative B would use silvicultural treatments to provide a diversity of habitats for Management Indicator Species more in line with historical conditions to maintain and enhance existing late- and old-structured stand characteristics, and encourage the development of such characteristics. It also would apply prescribed fire to fire-dependent ecosystems to create habitat conditions that allow fire to perform its natural ecological function and more closely mimic natural processes that maintain white-headed woodpecker habitat and other dependent wildlife species. There would be approximately 19.9 Million Board Feet (MMBF), of which approximately 70 percent is saw log.

The following table displays approximate acres of various treatments:

**Table 3. Proposed Activity and Approximate Acreage for the Rim-Paunina Project**

| Proposed Activities for Alternative B | Approximate Acres |
|---|---|
| Density reduction, or thinning, including commercial and non-commercial removal in ponderosa pine (HTH). | 6,082 |
| Improvement cutting primarily in lodgepole pine to enhance overall stand composition and quality (HIM). | 5,910 |
| Aspen Treatment | 43 |
| Disposal of activity-created slash without underburning. | 3,530 |
| Disposal of activity-created slash followed by prescribed underburning. | 8,506 |

### Connected Actions

In order for Alternative B to implemented, the following are connected actions:

- About 9.2 miles of temporary roads to be constructed.

**Table 4. Alternative B Management Units**

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[1] |
|---|---|---|---|---|---|---|
| 5 | 77 | HTH | GP/UB | GF | No | No |
| 6 | 20 | HIM | GP | GF | No | No |
| 10 | 7 | HTH | GP/UB | GF | No | No |
| 15 | 16 | HIM | GP | GF | No | No |
| 20 | 30 | HIM | GP | GF | No | No |
| 25 | 306 | HTH | GP/UB | GF | No | No |
| 30 | 57 | HIM | GP/UB | GF | No | No |
| 35 | 137 | HIM | GP | GF | No | No |
| 40 | 197 | HIM | GP | GF | No | No |
| 45 | 70 | HIM | GP | GF | No | No |
| 50 | 17 | HIM | SB | GF, SV | No | 14 ac. |
| 55 | 31 | HIM | SB | SV | No | 31 ac. |
| 60 | 95 | HIM | SB | GF, SV | No | 87 ac. |

[1] Only Scenic Views Foreground acres are shown is this column because they are potentially affected by vegetative prescriptions prescribed in this project. Partial Retention Middleground acres are not shown.

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[1] |
|---|---|---|---|---|---|---|
| 65 | 17 | HIM | SB | SV | No | 17 ac. |
| 70 | 176 | HTH | GP; SB in scenic/UB | GF | No | 140 ac. |
| 75 | 38 | HTH | GP | GF | No | No |
| 80 | 48 | HIM | GP/UB | GF | No | No |
| 85 | 29 | HTH | GP/UB | GF | No | No |
| 90 | 47 | HIM | GP; SB in scenic/UB | GF, SV | No | 5 ac. |
| 95 | 74 | HTH | GP; SB in scenic | GF, SV | No | 30 ac. |
| 110 | 28 | HIM | GP | GF | No | No |
| 115 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 120 | 70 | HTH | GP/UB | GF | No | No |
| 125 | 31 | HIM | GP/UB | GF | No | No |
| 130 | 184 | HIM | SB | GF, SV | No | 13 ac. |
| 135 | 34 | HIM | SB/UB | GF, SV | No | 33 ac. |
| 140 | 55 | HIM | GP; SB in scenic | GF, SV | No | 31 ac. |
| 145 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 150 | 53 | HIM | SB | SV | No | 53 ac. |
| 155 | 13 | HIM | SB | SV | No | 13 ac. |
| 160 | 9 | HTH | SB/UB | SV | No | 9 ac. |
| 165 | 15 | HIM | SB | SV | No | 15 ac. |
| 166 | 7 | HIM | SB | SV | No | 7 ac. |
| 167 | 4 | HIM | GP/UB | GF | No | No |
| 170 | 26 | HIM | GP/UB | GF, OG | 3 ac. | No |
| 171 | 22 | HIM | GP | GF, OG | 1 ac. | No |
| 180 | 113 | HTH | GP/UB | GF | No | No |
| 185 | 24 | HTH | GP/UB | GF | No | No |
| 190 | 22 | HTH | GP/UB | GF | No | No |
| 195 | 82 | HTH | GP/UB | GF, OG | 67 ac. | No |
| 200 | 10 | HTH | GP/UB | GF, OG | 9 ac. | No |
| 205 | 50 | HTH | GP/UB | GF, OG | 48 ac. | No |
| 215 | 15 | HIM | GP | GF | No | No |
| 220 | 23 | HIM | GP/UB | GF | No | No |
| 225 | 65 | HIM | GP | GF, OG | 1 ac. | No |
| 235 | 52 | HIM | SB | GF, SV | No | 48 ac. |
| 240 | 250 | HIM | GP/UB | GF | No | No |
| 245 | 24 | HIM | GP | GF | No | No |
| 250 | 23 | HIM | GP | GF | No | No |
| 255 | 52 | HTH | GP/UB | GF | No | No |
| 260 | 65 | HIM | GP | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[1] |
|---|---|---|---|---|---|---|
| 265 | 49 | HIM | GP | GF | No | No |
| 270 | 55 | HIM | GP | GF | No | No |
| 275 | 98 | HTH | GP/UB | GF | No | No |
| 285 | 29 | HIM | GP/UB | GF | No | No |
| 286 | 12 | HIM | GP/UB | GF | No | No |
| 290 | 57 | HTH | GP/UB | GF | No | No |
| 295 | 80 | HIM | GP/UB | GF | No | No |
| 300 | 72 | HTH | GP/UB | GF | No | No |
| 305 | 31 | HIM | GP | GF | No | No |
| 310 | 113 | HIM | GP | GF | No | No |
| 330 | 70 | HIM | GP | GF | No | No |
| 335 | 62 | HTH | GP | GF, OG | 3 ac. | No |
| 345 | 68 | HTH | GP/UB | GF | No | No |
| 350 | 79 | HTH | GP/UB | GF | No | No |
| 355 | 123 | HIM | GP | GF | No | No |
| 370 | 51 | HTH | GP/UB | GF | No | No |
| 385 | 68 | HTH | GP/UB | GF | No | No |
| 390 | 300 | HTH | GP/UB | GF | No | No |
| 395 | 36 | HIM | GP | GF | No | No |
| 400 | 26 | HTH | GP; SB in scenic/UB | GF, SV | No | 1 ac. |
| 405 | 43 | HTH | GP; SB in scenic/UB | GF, SV | No | 6 ac. |
| 410 | 143 | HTH | GP; SB in scenic/UB | GF, SV | No | 75 ac. |
| 415 | 64 | HIM | GP; SB in scenic | GF, SV | No | 51 ac. |
| 425 | 33 | HTH | GP; SB in scenic/UB | GF, SV | No | 21 ac. |
| 430 | 101 | HTH | GP; SB in scenic/UB | GF, SV | No | 67 ac. |
| 435 | 32 | HIM | GP | GF | No | No |
| 445 | 190 | HTH | GP/UB | GF | No | No |
| 460 | 13 | HIM | GP | GF | No | No |
| 465 | 9 | HTH | GP/UB | GF | No | No |
| 470 | 29 | HIM | GP/UB | GF | No | No |
| 475 | 167 | HIM | GP | GF | No | No |
| 480 | 85 | HIM | GP | GF | No | No |
| 490 | 266 | HIM | GP | GF | No | No |
| 495 | 47 | HIM | GP | GF | No | No |
| 510 | 66 | HIM | GP | GF | No | No |
| 605 | 26 | HTH | GP/UB | OG | 26 ac. | No |
| 610 | 48 | HIM | GP | GF, OG | 3 ac. | No |
| 620 | 65 | HTH | GP/UB | OG | 65 ac. | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[1] |
|---|---|---|---|---|---|---|
| 621 | 43 | Aspen | GP/UB | GF, OG | 39 ac. | No |
| 630 | 68 | HTH | GP/UB | GF, OG | 4 ac. | No |
| 640 | 166 | HIM | GP/UB | GF, OG | 10 ac. | No |
| 645 | 296 | HIM | GP | GF | No | No |
| 650 | 54 | HTH | GP/UB | GF, OG | 4 ac. | No |
| 655 | 185 | HTH | GP/UB | GF | No | No |
| 660 | 14 | HIM | GP | GF | No | No |
| 665 | 214 | HTH | GP/UB | GF | No | No |
| 670 | 38 | HIM | GP | GF | No | No |
| 675 | 52 | HIM | GP | GF | No | No |
| 680 | 58 | HTH | GP/UB | GF | No | No |
| 685 | 121 | HTH | GP/UB | GF | No | No |
| 690 | 120 | HTH | GP/UB | GF, OG | 118 ac. | No |
| 700 | 67 | HIM | GP/UB | GF, OG | 3 ac. | No |
| 710 | 105 | HIM | GP/UB | GF, OG | 1 ac. | No |
| 720 | 17 | HTH | GP/UB | GF | No | No |
| 725 | 32 | HTH | GP/UB | GF | No | No |
| 730 | 73 | HIM | GP | GF, SV | No | No Foreground |
| 735 | 67 | HTH | GP/UB | GF, SV | No | No Foreground |
| 740 | 339 | HIM | GP/UB | GF, OG | 318 ac. | No |
| 745 | 168 | HIM | GP/UB | GF, OG | 153 ac. | No |
| 750 | 95 | HTH | GP/UB | GF | 1 ac. | No |
| 755 | 106 | HTH | GP/UB | GF | No | No |
| 765 | 370 | HIM | GP/UB | GF | No | No |
| 770 | 165 | HIM | GP/UB | GF | No | No |
| 775 | 235 | HIM | GP; SB in scenic/UB | GF, SV | No | 18 ac. |
| 780 | 100 | HIM | SB | GF, SV | No | 96 ac. |
| 785 | 199 | HTH | GP/UB | GF | No | No |
| 795 | 22 | HTH | GP/UB | GF | No | No |
| 796 | 40 | HTH | GP/UB | GF | No | No |
| 800 | 69 | HTH | GP/UB | GF | No | No |
| 805 | 57 | HTH | GP/UB | GF | No | No |
| 810 | 149 | HTH | GP/UB | GF | No | No |
| 815 | 92 | HTH | GP/UB | GF | No | No |
| 820 | 164 | HIM | GP/UB | GF | No | No |
| 825 | 68 | HTH | GP/UB | GF | No | No |
| 830 | 60 | HTH | GP/UB | GF, SV | No | No Foreground |
| 835 | 18 | HTH | GP/UB | SV | No | No Foreground |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[1] |
|---|---|---|---|---|---|---|
| 850 | 27 | HTH | GP/UB | GF, SV | No | No Foreground |
| 855 | 33 | HTH | GP/UB | GF, SV | No | No Foreground |
| 860 | 9 | HIM | SB/UB | SV | No | 9 ac. |
| 865 | 51 | HTH | SB/UB | SV | No | 51 ac. |
| 870 | 145 | HTH | GP; SB in scenic/UB | GF, SV | No | 64 ac. |
| 875 | 57 | HTH | GP/UB | GF | No | No |
| 876 | 40 | HTH | GP/UB | GF | No | No |
| 880 | 84 | HTH | GP/UB | GF | No | No |
| 885 | 30 | HTH | GP/UB | GF | No | No |
| 890 | 21 | HTH | GP/UB | GF | No | No |
| 895 | 92 | HTH | GP/UB | GF, OG | 92 ac. | No |
| 940 | 150 | HIM | SB/UB | SV | No | 150 ac. |
| 945 | 106 | HIM | SB/UB | GF, SV | No | 99 ac |
| 965 | 33 | HTH | GP/UB | SV | No | No Foreground |
| 975 | 41 | HTH | GP | OG | 41 ac. | No |
| 980 | 37 | HTH | GP/UB | OG, SV | 22 ac. | No Foreground |
| 1025 | 38 | HTH | GP/UB | OG, SV | 20 ac. | No Foreground |
| 1030 | 97 | HTH | GP/UB | GF, SV, OG | 55 ac. | No Foreground |
| 1040 | 28 | HIM | GP | GF | No | No |
| 1045 | 105 | HTH | GP; SB in scenic/UB | GF, SV | No | 44 ac. |
| 1050 | 38 | HIM | SB/UB | SV | No | 38 ac. |
| 1051 | 7 | HIM | SB | SV | No | 7 ac. |
| 1056 | 11 | HIM | GP | GF | No | No |
| 1060 | 66 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1065 | 102 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1070 | 43 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1085 | 70 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1090 | 20 | HIM | GP | GF | No | No |
| 1095 | 74 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1096 | 24 | HTH | GP/UB | GF, SV | No | No Foreground |
| 2000 | 72 | HTH | GP | GF | No | No |
| 2005 | 83 | HTH | GP | GF | No | No |
| 2010 | 38 | HTH | GP/UB | OG | 37 ac. | No |
| **Total unit acres for Alternative B = 12,036** | | | | | | |

HIM = Harvest Improvement Cut
HTH = Harvest Commercial Thin
Aspen-Unit #621 only, to facilitate aspen regeneration
GP = Grapple pile material, utilization of piles or disposal; or slash busting/mastication by machine with no pile disposal
UB = Prescribed underburning

SB = Slash busting (brush mastication) with no pile disposal or handpile with disposal in scenic areas
GF = General Forest
OG = Old Growth
SV = Scenic Views (Foreground and Middleground)

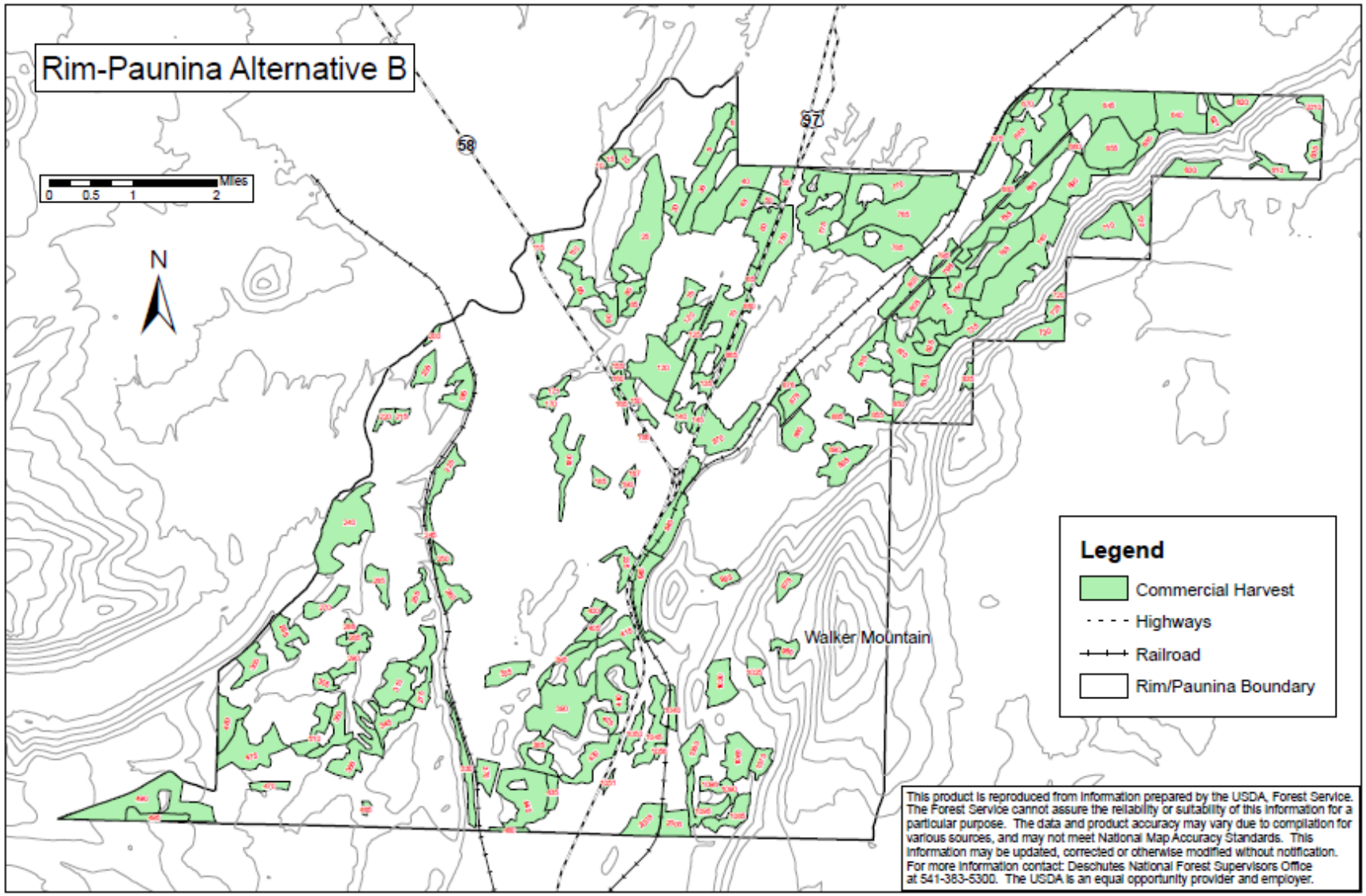



**Figure 2 Alternative B Proposed Units within the Rim-Paunina Planning Area**

## Alternative C

This alternative was developed to provide more of a balance between species that prefer open ponderosa pine stands and those that favor denser, multi-layered conditions (Key Issue #1), retaining approximately 395 acres of dense stands in comparison to the proposed action. Also, it retains many decadent lodgepole pine stands (1,878 acres in comparison to the proposed action) to provide more of a balance between short and long-terms by providing habitat for Management Indicator Species such as the black-backed woodpecker and the marten (Key Issue #3). Return of a frequent fire regime in appropriate stands is also a component of this alternative (Key Issue #4), which includes 1,205 acres of small diameter thinning within the Old Growth Management Area on Walker Rim, handpiling, and disposal. Then, a low-intensity fire would be carefully applied to ready the stand for a frequent fire regime in a maintenance mode. This activity would be coded "Fuels Only" along with 3,780 acres of slashbusting/brush mastication and prescribed fire in stands that are ready for a frequent fire regime without reduction of stand density.

In addition to deferring management in some lodgepole pine stands, this alternative incorporates some additional passively-managed patches or "retention areas" greater than 15 percent in some ponderosa pine and lodgepole pine activity units. The objective is to provide more contiguous suitable habitat for a potential goshawk nest stand; nesting, roosting, foraging for black-backed woodpeckers; denning and foraging for pine marten; and hiding cover, foraging for big game. There would be approximately 15.3 Million Board Feet (MMBF), of which approximately 70 percent is saw log.

**Table 5. Proposed Activities for Alternative C**

| Proposed Activities for Alternative C | Approximate Acres |
|---|---|
| Density reduction, or thinning, including commercial and non-commercial removal in ponderosa pine (HTH). | 5,717 |
| Improvement cutting primarily in lodgepole pine to enhance overall stand composition and quality (HIM). | 4,032 |
| Aspen Treatment | 43 |
| Disposal of activity-created slash without underburning. | 2,015 |
| Disposal of activity-created slash followed by prescribed underburning. | 7,777 |
| Brush mastication and/or application of prescribed "maintenance" burning outside of commercial harvest units. | 3,780 |
| Thin small diameter material, pruning of limbs, pile, dispose of piles, and then apply prescribed underburning. | 1,205 |

### Connected Actions

In order for Alternative C to implemented, the following are connected actions:

- About 6.5 miles of temporary roads to be constructed.

**Table 6. Alternative C Management Units**

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[2] |
|---|---|---|---|---|---|---|
| 5 | 77 | HTH | GP/UB | GF | No | No |
| 6 | 20 | HIM | GP | GF | No | No |

[2] Only Scenic Views Foreground acres are shown is this column because they are affected by vegetative prescriptions prescribed in this project. Partial Retention Middleground acres are not shown.

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[2] |
|---|---|---|---|---|---|---|
| 10 | 7 | HTH | GP/UB | GF | No | No |
| 15 | 16 | HIM | GP | GF | No | No |
| 20 | 30 | HIM | GP | GF | No | No |
| 25 | 306 | HTH | GP/UB | GF | No | No |
| 30 | 57 | HIM | GP/UB | GF | No | No |
| 40 | 197 | HIM | GP | GF | No | No |
| 45 | 70 | HIM | GP | GF | No | No |
| 50 | 17 | HIM | SB | GF, SV | No | 14 ac. |
| 60 | 95 | HIM | SB | GF, SV | No | 87 ac. |
| 65 | 17 | HIM | SB | SV | No | 17 ac. |
| 70 | 176 | HTH | GP; SB in scenic/UB | GF, SV | No | 140 ac. |
| 80 | 48 | HIM | GP/UB | GF | No | No |
| 85 | 29 | HTH | GP/UB | GF | No | No |
| 90 | 47 | HIM | GP; SB in scenic/UB | GF, SV | No | 5 ac. |
| 110 | 28 | HIM | GP | GF | No | No |
| 115 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 120 | 70 | HTH | GP/UB | GF | No | No |
| 135 | 34 | HIM | SB | GF, SV | No | 33 ac. |
| 140 | 55 | HIM | GP; SB in scenic | GF, SV | No | 31 ac. |
| 145 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 155 | 13 | HIM | SB | SV | No | 13 ac. |
| 160 | 9 | HTH | SB/UB | SV | No | 9 ac. |
| 165 | 15 | HIM | SB/UB | SV | No | 15 ac. |
| 166 | 7 | HIM | SB | SV | No | 7 ac. |
| 167 | 4 | HIM | GP/UB | GF | No | No |
| 170 | 26 | HIM | GP/UB | GF, OG | 3 ac. | No |
| 180 | 113 | HTH | GP/UB | GF | No | No |
| 185 | 24 | HTH | GP/UB | GF | No | No |
| 190 | 22 | HTH | GP/UB | GF | No | No |
| 195 | 82 | HTH | GP/UB | GF, OG | 67 ac. | No |
| 200 | 10 | HTH | GP/UB | GF, OG | 9 ac. | No |
| 205 | 50 | HTH | GP/UB | GF, OG | 48 ac. | No |
| 225 | 65 | HIM | GP | GF, OG | 1 ac. | No |
| 235 | 52 | HIM | SB | GF, SV | No | 48 ac. |
| 240 | 250 | HIM | GP/UB | GF | No | No |
| 250 | 23 | HIM | GP | GF | No | No |
| 255 | 52 | HTH | GP/UB | GF | No | No |
| 260 | 65 | HIM | GP | GF | No | No |
| 265 | 49 | HIM | GP | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[2] |
|---|---|---|---|---|---|---|
| 275 | 98 | HTH | GP/UB | GF | No | No |
| 285 | 29 | HIM | GP/UB | GF | No | No |
| 286 | 12 | HIM | GP/UB | GF | No | No |
| 290 | 57 | HTH | GP/UB | GF | No | No |
| 295 | 80 | HIM | GP/UB | GF | No | No |
| 300 | 72 | HTH | GP/UB | GF | No | No |
| 345 | 68 | HTH | GP/UB | GF | No | No |
| 350 | 79 | HTH | GP/UB | GF | No | No |
| 355 | 123 | HIM | GP | GF | No | No |
| 370 | 51 | HTH | GP/UB | GF | No | No |
| 385 | 68 | HTH | GP/UB | GF | No | No |
| 390 | 300 | HTH | GP/UB | GF | No | No |
| 400 | 26 | HTH | GP; SB in scenic/UB | GF, SV | No | 1 ac. |
| 405 | 43 | HTH | GP; SB in scenic/UB | GF, SV | No | 6 ac. |
| 410 | 143 | HTH | GP; SB in scenic/UB | GF, SV | No | 75 ac. |
| 425 | 33 | HTH | GP; SB in scenic/UB | GF, SV | No | 21 ac. |
| 430 | 101 | HTH | GP; SB in scenic/UB | GF, SV | No | 67 ac. |
| 445 | 190 | HTH | GP/UB | GF | No | No |
| 465 | 9 | HTH | GP/UB | GF | No | No |
| 470 | 29 | HIM | GP/UB | GF | No | No |
| 490 | 266 | HIM | GP | GF | No | No |
| 495 | 47 | HIM | GP | GF | No | No |
| 510 | 66 | HIM | GP | GF | No | No |
| 605 | 26 | HTH | GP/UB | OG | 26 ac. | No |
| 610 | 48 | HIM | GP | GF, OG | 3 ac. | No |
| 615 | 182 | Fuels Only | SDT/HP/UB | OG | 181 ac. | No |
| 620 | 65 | HTH | GP/UB | OG | 65 ac. | No |
| 621 | 43 | Aspen | GP/UB | GF, OG | 39 ac. | No |
| 625 | 76 | Fuels Only | SDT/HP/UB | GF, OG | 66 ac. | No |
| 630 | 68 | HTH | GP/UB | GF, OG | 4 ac. | No |
| 640 | 166 | HIM | GP/UB | GF, OG | 10 ac. | No |
| 645 | 296 | HIM | GP | GF | No | No |
| 650 | 54 | HTH | GP/UB | GF, OG | 4 ac. | No |
| 655 | 185 | HTH | GP/UB | GF | No | No |
| 660 | 14 | HIM | GP | GF | No | No |
| 665 | 214 | HTH | GP/UB | GF | No | No |
| 670 | 38 | HIM | GP | GF | No | No |
| 680 | 58 | HTH | GP/UB | GF | No | No |
| 685 | 121 | HTH | GP/UB | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[2] |
|---|---|---|---|---|---|---|
| 690 | 120 | HTH | GP/UB | GF, OG | 118 ac. | No |
| 700 | 67 | HIM | GP/UB | GF, OG | 2 ac. | No |
| 710 | 105 | HIM | GP/UB | GF, OG | 1 ac. | No |
| 720 | 17 | HTH | GP/UB | GF | No | No |
| 725 | 32 | HTH | GP/UB | GF | No | No |
| 730 | 73 | HIM | GP | GF, SV | No | No Foreground |
| 735 | 67 | HTH | GP/UB | GF, SV | No | No Foreground |
| 750 | 95 | HTH | GP/UB | GF, OG | 1 ac. | No |
| 755 | 106 | HTH | GP/UB | GF | No | No |
| 765 | 370 | HIM | GP/UB | GF | No | No |
| 770 | 164 | HIM | GP/UB | GF | No | No |
| 775 | 235 | HIM | GP; SB in scenic/UB | GF, SV | No | 18 ac. |
| 785 | 199 | HTH | GP/UB | GF | No | No |
| 795 | 22 | HTH | GP/UB | GF | No | No |
| 796 | 40 | HTH | GP/UB | GF | No | No |
| 800 | 69 | HTH | GP/UB | GF | No | No |
| 805 | 57 | HTH | GP/UB | GF | No | No |
| 815 | 92 | HTH | GP/UB | GF | No | No |
| 820 | 164 | HIM | GP/UB | GF | No | No |
| 825 | 68 | HTH | GP/UB | GF | No | No |
| 830 | 60 | HTH | GP/UB | GF, SV | No | No Foreground |
| 835 | 18 | HTH | GP/UB | SV | No | No Foreground |
| 850 | 27 | HTH | GP/UB | GF, SV | No | No Foreground |
| 855 | 33 | HTH | GP/UB | GF, SV | No | No Foreground |
| 860 | 9 | HIM | SB/UB | SV | No | 9 ac. |
| 865 | 51 | HTH | SB/UB | SV | No | 51 ac. |
| 870 | 145 | HTH | GP; SB in scenic/UB | GF, SV | No | 64 ac. |
| 875 | 57 | HTH | GP/UB | GF | No | No |
| 876 | 40 | HTH | GP/UB | GF | No | No |
| 880 | 84 | HTH | GP/UB | GF | No | No |
| 885 | 30 | HTH | GP/UB | GF | No | No |
| 890 | 21 | HTH | GP/UB | GF | No | No |
| 895 | 92 | HTH | GP/UB | GF, OG | 92 ac. | No |
| 905 | 173 | Fuels Only | SDT/HP/UB | OG | 173 ac. | No |
| 910 | 47 | Fuels Only | SDT/HP/UB | GF, OG | 46 ac. | No |
| 925 | 47 | Fuels Only | SDT/HP/UB | GF, SV | No | No Foreground |
| 930 | 199 | Fuels Only | SDT/HP/UB | GF, OG | 198 ac. | No |
| 935 | 37 | Fuels Only | SDT/HP/UB | OG | 37 ac. | No |
| 940 | 150 | HIM | SB/UB | SV | No | 150 ac. |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[2] |
|---|---|---|---|---|---|---|
| 945 | 106 | HIM | SB/UB | GF, SV | No | 99 ac. |
| 965 | 33 | HTH | GP/UB | OG, SV | No | No Foreground |
| 970 | 49 | Fuels Only | SDT/HP/UB | OG | 49 ac. | No |
| 980 | 37 | HTH | GP/UB | OG, SV | 22 ac. | No Foreground |
| 1020 | 86 | Fuels Only | SDT/HP/UB | OG, SV | 63 ac. | No Foreground |
| 1025 | 38 | HTH | GP/UB | OG, SV | 20 ac. | No Foreground |
| 1030 | 97 | HTH | GP/UB | GF, OG, SV | 55 ac. | No Foreground |
| 1040 | 28 | HIM | GP | GF | No | No |
| 1045 | 105 | HTH | GP; SB in scenic/UB | GF, SV | No | 44 ac. |
| 1050 | 38 | HIM | SB/UB | SV | No | 38 ac. |
| 1051 | 7 | HIM | SB | SV | No | 7 ac. |
| 1060 | 66 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1065 | 102 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1070 | 43 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1080 | 92 | Fuels Only | SDT/HP/UB | GF, SV | No | No Foreground |
| 1085 | 70 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1095 | 74 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1096 | 24 | HTH | GP/UB | GF, SV | No | No Foreground |
| 2000 | 72 | HTH | GP | GF | No | No |
| 2005 | 83 | HTH | GP | GF | No | No |
| 2010 | 38 | HTH | GP/UB | OG | 37 ac. | No |
| 3000 | 219 | Fuels Only | SDT/HP/UB | GF, OG | 140 ac. | No |
| 3005 | 138 | Fuels Only | SB/UB | GF | No | No |
| 3010 | 128 | Fuels Only | SB/UB | GF | No | No |
| 3015 | 127 | Fuels Only | SB/UB | GF, SV | No | 110 ac. |
| 3020 | 206 | Fuels Only | SB/UB | GF | No | No |
| 3025 | 142 | Fuels Only | SB/UB | GF | No | No |
| 3030 | 37 | Fuels Only | SB/UB | GF | No | No |
| 3035 | 20 | Fuels Only | SB/UB | GF | No | No |
| 3040 | 55 | Fuels Only | SB/UB | GF, SV | No | 17 ac. |
| 3045 | 18 | Fuels Only | SB/UB | GF | No | No |
| 3050 | 107 | Fuels Only | SB/UB | GF, SV | No | 37 ac. |
| 3055 | 5 | Fuels Only | SB/UB | GF, OG | 4 ac. | No |
| 3060 | 91 | Fuels Only | SB/UB | GF, OG | 17 ac. | No |
| 3065 | 144 | Fuels Only | SB/UB | GF | No | No |
| 3070 | 68 | Fuels Only | SB/UB | GF | No | No |
| 3075 | 15 | Fuels Only | SB/UB | GF | No | No |
| 3080 | 43 | Fuels Only | SB/UB | GF | No | No |
| 3085 | 14 | Fuels Only | SB/UB | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[2] |
|---|---|---|---|---|---|---|
| 3090 | 14 | Fuels Only | SB/UB | GF | No | No |
| 3095 | 41 | Fuels Only | SB/UB | GF | No | No |
| 4000 | 16 | Fuels Only | SB/UB | GF | No | No |
| 4005 | 7 | Fuels Only | SB/UB | GF | No | No |
| 4010 | 27 | Fuels Only | SB/UB | OG | 27 ac. | No |
| 4015 | 13 | Fuels Only | SB/UB | OG | 13 ac. | No |
| 4020 | 60 | Fuels Only | SB/UB | GF, OG | 6 ac. | No |
| 4025 | 8 | Fuels Only | SB/UB | OG | 8 ac. | No |
| 4030 | 78 | Fuels Only | SB/UB | GF, OG, SV | 2 ac. | No Foreground |
| 4035 | 153 | Fuels Only | SB/UB | OG | 153 ac. | No |
| 4040 | 146 | Fuels Only | SB/UB | GF, OG | 144 ac. | No |
| 4045 | 80 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 4050 | 292 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 4055 | 108 | Fuels Only | SB/UB | OG | 108 ac. | No |
| 4060 | 63 | Fuels Only | SB/UB | GF, OG, SV | 43 ac. | No Foreground |
| 4065 | 14 | Fuels Only | SB/UB | GF | No | No |
| 4070 | 62 | Fuels Only | SB/UB | GF | No | No |
| 4075 | 42 | Fuels Only | SB/UB | GF, OG | 36 ac. | No |
| 4080 | 11 | Fuels Only | SB/UB | GF | No | No |
| 4085 | 79 | Fuels Only | SB/UB | GF | No | No |
| 4090 | 7 | Fuels Only | SB/UB | GF | No | No |
| 4095 | 393 | Fuels Only | SB/UB | GF | No | No |
| 5000 | 58 | Fuels Only | SB/UB | GF | No | No |
| 5005 | 56 | Fuels Only | SB/UB | GF | No | No |
| 5010 | 9 | Fuels Only | SB/UB | GF | No | No |
| 5015 | 39 | Fuels Only | SB/UB | OG, SV | 1 ac. | No Foreground |
| 5020 | 18 | Fuels Only | SB/UB | OG, SV | 7 ac. | No Foreground |
| 5025 | 19 | Fuels Only | SB/UB | SV | No | No Foreground |
| 5030 | 22 | Fuels Only | SB/UB | SV | No | No Foreground |
| 5035 | 408 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 5040 | 46 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 5045 | 35 | Fuels Only | SB/UB | SV | No | No Foreground |
| **Total unit acres for Alternative C = 14,780** | | | | | | |

HIM = Harvest Improvement Cut
HTH = Harvest Commercial Thin
Aspen-Unit #621 only, to facilitate aspen regeneration
Fuels Only= Accomplished without a commercial timber sale. For units on Walker Rim, includes Small Diameter Thinning (SDT), hand piling (HP), and disposal. All other "Fuels Only" units are those ready for restoring to a frequent fire regime without any tree thinning. Activities include, slashbusting/brush mastication (SB) and prescribed underburning (UB)

GP = Grapple pile material, utilization of piles or disposal; or slash busting/mastication by machine with no pile disposal
UB = Prescribed underburning
SB = Slash busting (brush mastication) with no pile disposal or handpile with disposal in scenic areas
GF = General Forest
OG = Old Growth
SV = Scenic Views (Foreground and Middleground)

## Alternative D

This alternative uses Alternative C units as the base and addresses dwarf mistletoe infection (Key Issue #2) by emphasizing a focused strategy to reduce the length in time for when large trees are absent from those areas most heavily infected. It uses density control and application of prescribed fire in "light" and "moderate" infected stands; however it is more aggressive in approximately 2,500 acres of stands categorized as "severely infected", as determined by on-the-ground inventory. This alternative proposes to break the cycle of continual infection by creating openings of 2-5 acres across portions of stands where ponderosa pine seedlings currently have little chance to advance beyond a seedling/sapling stage. These openings would be created on approximately 30 percent of the area in severely infected stands. In those openings all trees, including those over 21 inches in diameter, would be cut and removed followed by planting of ponderosa pine. In addition to addressing the future health of the stands, these openings would serve to create a mosaic of different tree sizes and densities within each stand, which was a historical component. The remaining 70 percent would use density reduction prescriptions to retain the healthiest trees, as well as all trees 21 inches and over.

A Forest Plan amendment to the Eastside Screens would be required for this alternative to remove severely infected trees 21 inches and over, and to amend direction for Late and Old Structured (LOS) stands. This alternative addresses Key Issue #1 (retention of dense ponderosa pine stands) and Key Issue #3 (retention of decadent lodgepole stands) to the same degree as Alternative C. Return of a frequent fire regime in appropriate stands (shown as "Fuels Only" and described in Alternative C description of activities) is also a component of this alternative (Key Issue #4). This alternative is estimated to produce approximately 25.3 Million Board Feet (MMBF), of which approximately 70 percent would be in saw logs.

**Table 7. Proposed Activities for Alternative D**

| Proposed Activities for Alternative D | Approximate Acres |
|---|---|
| Density reduction, or thinning, including commercial and non-commercial removal in ponderosa pine (HTH). | 6,122 |
| Improvement cutting primarily in lodgepole pine to enhance overall stand composition and quality (HIM). | 2,849 |
| Group selection (HSG) in the most severely infected stands includes openings 2-5 acres. Includes removing trees over 21 inches in diameter. | 778[3] |
| Aspen Treatment | 43 |
| Disposal of activity-created slash without underburning. | 2,015 |
| Disposal of activity-created slash followed by prescribed underburning. | 7,777 |
| Brush mastication and/or application of prescribed "maintenance" burning outside of commercial harvest units. | 3,780 |

[3] This is approximately 30 percent of total HSG acres (2,593) in the Rim-Paunina project area. The remaining 1,815 acres would be treated as HTH.

| Proposed Activities for Alternative D | Approximate Acres |
|---|---|
| Thin small diameter material, pruning of limbs, pile, dispose of piles, and then apply prescribed underburning. | 1,205 |

**Connected Actions**

In order for Alternative D to implemented, the following are connected actions:

- About 6.5 miles of temporary roads to be constructed.

**Table 8. Alternative D Management Units**

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[4] |
|---|---|---|---|---|---|---|
| 5 | 77 | HTH | GP/UB | GF | No | No |
| 6 | 20 | HIM | GP | GF | No | No |
| 10 | 7 | HTH | GP/UB | GF | No | No |
| 15 | 16 | HIM | GP | GF | No | No |
| 20 | 30 | HIM | GP | GF | No | No |
| 25 | 306 | HTH | GP/UB | GF | No | No |
| 30 | 57 | HIM | GP/UB | GF | No | No |
| 40 | 197 | HIM | GP | GF | No | No |
| 45 | 70 | HIM | GP | GF | No | No |
| 50 | 17 | HIM | SB | GF, SV | No | 14 ac. |
| 60 | 95 | HIM | SB | GF, SV | No | 87 ac. |
| 65 | 17 | HIM | SB | SV | No | 17 ac. |
| 70 | 176 | HTH | GP; SB in scenic/UB | GF, SV | No | 140 ac. |
| 80 | 48 | HIM | GP/UB | GF | No | No |
| 85 | 29 | HTH | GP/UB | GF | No | No |
| 90 | 47 | HIM | GP; SB in scenic/UB | GF, SV | No | 5 ac. |
| 110 | 28 | HIM | GP | GF | No | No |
| 115 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 120 | 70 | HTH | GP/UB | GF | No | No |
| 135 | 34 | HIM | SB | GF, SV | No | 33 ac. |
| 140 | 55 | HIM | GP; SB in scenic | GF, SV | No | 31 ac. |
| 145 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 155 | 13 | HIM | SB | SV | No | 13 ac. |
| 160 | 9 | HTH | SB/UB | SV | No | 9 ac. |
| 165 | 15 | HIM | SB/UB | SV | No | 15 ac. |
| 166 | 7 | HIM | SB | SV | No | 7 ac. |
| 167 | 4 | HIM | GP/UB | GF | No | No |
| 170 | 26 | HIM | GP/UB | GF, OG | 3 ac. | No |
| 180 | 113 | HTH | GP/UB | GF | No | No |

[4] Only Scenic Views Foreground acres are shown is this column because they are affected by vegetative prescriptions prescribed in this project. Partial Retention Middleground acres are not shown.

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[4] |
|---|---|---|---|---|---|---|
| 185 | 24 | HTH | GP/UB | GF | No | No |
| 190 | 22 | HTH | GP/UB | GF | No | No |
| 195 | 82 | HTH | GP/UB | GF, OG | 67 ac. | No |
| 200 | 10 | HTH | GP/UB | GF, OG | 9 ac. | No |
| 205 | 50 | HTH | GP/UB | GF, OG | 48 ac. | No |
| 225 | 65 | HIM | GP | GF, OG | 1 ac. | No |
| 235 | 52 | HIM | SB | GF, SV | No | 48 ac. |
| 240 | 250 | HSG | GP/UB | GF | No | No |
| 250 | 23 | HIM | GP | GF | No | No |
| 255 | 52 | HTH | GP/UB | GF | No | No |
| 260 | 65 | HIM | GP | GF | No | No |
| 265 | 49 | HIM | GP | GF | No | No |
| 275 | 98 | HTH | GP/UB | GF | No | No |
| 285 | 29 | HIM | GP/UB | GF | No | No |
| 286 | 12 | HIM | GP/UB | GF | No | No |
| 290 | 57 | HTH | GP/UB | GF | No | No |
| 295 | 80 | HIM | GP/UB | GF | No | No |
| 300 | 72 | HTH | GP/UB | GF | No | No |
| 345 | 68 | HTH | GP/UB | GF | No | No |
| 350 | 79 | HTH | GP/UB | GF | No | No |
| 355 | 123 | HIM | GP | GF | No | No |
| 370 | 51 | HTH | GP/UB | GF | No | No |
| 385 | 68 | HTH | GP/UB | GF | No | No |
| 390 | 300 | HTH | GP/UB | GF | No | No |
| 400 | 26 | HTH | GP; SB in scenic/UB | GF, SV | No | 1 ac. |
| 405 | 43 | HTH | GP; SB in scenic/UB | GF, SV | No | 6 ac. |
| 410 | 143 | HTH | GP; SB in scenic/UB | GF, SV | No | 75 ac. |
| 425 | 33 | HTH | GP; SB in scenic/UB | GF, SV | No | 21 ac. |
| 430 | 101 | HTH | GP; SB in scenic/UB | GF, SV | No | 67 ac. |
| 445 | 190 | HTH | GP/UB | GF | No | No |
| 465 | 9 | HTH | GP/UB | GF | No | No |
| 470 | 29 | HIM | GP/UB | GF | No | No |
| 490 | 266 | HIM | GP | GF | No | No |
| 495 | 47 | HIM | GP | GF | No | No |
| 510 | 66 | HIM | GP | GF | No | No |
| 605 | 26 | HTH | GP/UB | OG | 26 ac. | No |
| 610 | 48 | HIM | GP | GF, OG | 3 ac. | No |
| 615 | 182 | Fuels Only | SDT/HP/UB | OG | 181 ac. | No |
| 620 | 65 | HSG | GP/UB | OG | 65 ac. | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[4] |
|---|---|---|---|---|---|---|
| 621 | 43 | Aspen | GP/UB | GF, OG | 39 ac. | No |
| 625 | 76 | Fuels Only | SDT/HP/UB | GF, OG | 66 ac. | No |
| 630 | 68 | HTH | GP/UB | GF, OG | 4 ac. | No |
| 640 | 166 | HIM | GP/UB | GF, OG | 10 ac. | No |
| 645 | 296 | HIM | GP | GF | No | No |
| 650 | 54 | HSG | GP/UB | GF, OG | 4 ac. | No |
| 655 | 185 | HSG | GP/UB | GF | No | No |
| 660 | 14 | HIM | GP | GF | No | No |
| 665 | 214 | HTH | GP/UB | GF | No | No |
| 670 | 38 | HIM | GP | GF | No | No |
| 680 | 58 | HTH | GP/UB | GF | No | No |
| 685 | 121 | HSG | GP/UB | GF | No | No |
| 690 | 120 | HSG | GP/UB | GF, OG | 118 ac. | No |
| 700 | 67 | HIM | GP/UB | GF, OG | 3 ac. | No |
| 710 | 105 | HIM | GP/UB | GF, OG | 1 ac. | No |
| 720 | 17 | HTH | GP/UB | GF | No | No |
| 725 | 32 | HTH | GP/UB | GF | No | No |
| 730 | 73 | HIM | GP | GF, SV | No | No Foreground |
| 735 | 67 | HSG | GP/UB | GF, SV | No | No Foreground |
| 750 | 95 | HSG | GP/UB | GF | No | No |
| 755 | 106 | HSG | GP/UB | GF | No | No |
| 765 | 370 | HSG | GP/UB | GF | No | No |
| 770 | 164 | HSG | GP/UB | GF | No | No |
| 775 | 235 | HSG | GP; SB in scenic/UB | GF, SV | No | 18 ac. |
| 785 | 199 | HSG | GP/UB | GF | No | No |
| 795 | 22 | HTH | GP/UB | GF | No | No |
| 796 | 40 | HTH | GP/UB | GF | No | No |
| 800 | 69 | HSG | GP/UB | GF | No | No |
| 805 | 57 | HSG | GP/UB | GF | No | No |
| 815 | 92 | HTH | GP/UB | GF | No | No |
| 820 | 164 | HSG | GP/UB | GF | No | No |
| 825 | 68 | HSG | GP/UB | GF | No | No |
| 830 | 60 | HTH | GP/UB | GF, SV | No | No Foreground |
| 835 | 18 | HTH | GP/UB | SV | No | No Foreground |
| 850 | 27 | HSG | GP/UB | GF, SV | No | No Foreground |
| 855 | 33 | HSG | GP/UB | GF, SV | No | No Foreground |
| 860 | 9 | HIM | SB/UB | SV | No | 9 ac. |
| 865 | 51 | HTH | SB/UB | SV | No | 51 ac. |
| 870 | 145 | HTH | GP; SB in scenic/UB | GF, SV | No | 64 ac. |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[4] |
|---|---|---|---|---|---|---|
| 875 | 57 | HTH | GP/UB | GF | No | No |
| 876 | 40 | HTH | GP/UB | GF | No | No |
| 880 | 84 | HTH | GP/UB | GF | No | No |
| 885 | 30 | HSG | GP/UB | GF | No | No |
| 890 | 21 | HSG | GP/UB | GF | No | No |
| 895 | 92 | HSG | GP/UB | GF, OG | 92 ac. | No |
| 905 | 173 | Fuels Only | SDT/HP/UB | OG | 173 ac. | No |
| 910 | 47 | Fuels Only | SDT/HP/UB | GF, OG | 46 ac. | No |
| 925 | 47 | Fuels Only | SDT/HP/UB | GF, SV | No | No Foreground |
| 930 | 199 | Fuels Only | SDT/HP/UB | GF, OG | 198 ac. | No |
| 935 | 37 | Fuels Only | SDT/HP/UB | OG | 37 ac. | No |
| 940 | 150 | HIM | SB/UB | SV | No | 150 ac. |
| 945 | 106 | HIM | SB/UB | GF, SV | No | 99 ac. |
| 965 | 33 | HTH | GP/UB | OG, SV | No | No Foreground |
| 970 | 49 | Fuels Only | SDT/HP/UB | OG | 49 ac. | No |
| 980 | 37 | HTH | GP/UB | OG, SV | 22 ac. | No Foreground |
| 1020 | 86 | Fuels Only | SDT/HP/UB | OG, SV | 63 ac. | No Foreground |
| 1025 | 38 | HTH | GP/UB | OG, SV | 20 ac. | No Foreground |
| 1030 | 97 | HTH | GP/UB | GF, OG, SV | 55 ac. | No Foreground |
| 1040 | 28 | HIM | GP | GF | No | No |
| 1045 | 105 | HTH | GP; SB in scenic/UB | GF, SV | No | 44 ac. |
| 1050 | 38 | HIM | SB/UB | SV | No | 38 ac. |
| 1051 | 7 | HIM | SB | SV | No | 7 ac. |
| 1060 | 66 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1065 | 102 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1070 | 43 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1080 | 92 | Fuels Only | SDT/HP/UB | GF, SV | No | No Foreground |
| 1085 | 70 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1095 | 74 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1096 | 24 | HTH | GP/UB | GF, SV | No | No Foreground |
| 2000 | 72 | HTH | GP | GF | No | No |
| 2005 | 83 | HTH | GP | GF | No | No |
| 2010 | 38 | HTH | GP/UB | OG | 37 ac. | No |
| 3000 | 219 | Fuels Only | SDT/HP/UB | GF, OG | 140 ac. | No |
| 3005 | 138 | Fuels Only | SB/UB | GF | No | No |
| 3010 | 128 | Fuels Only | SB/UB | GF | No | No |
| 3015 | 127 | Fuels Only | SB/UB | GF, SV | No | 110 ac. |
| 3020 | 206 | Fuels Only | SB/UB | GF | No | No |
| 3025 | 142 | Fuels Only | SB/UB | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[4] |
|---|---|---|---|---|---|---|
| 3030 | 37 | Fuels Only | SB/UB | GF | No | No |
| 3035 | 20 | Fuels Only | SB/UB | GF | No | No |
| 3040 | 55 | Fuels Only | SB/UB | GF, SV | No | 17 ac. |
| 3045 | 18 | Fuels Only | SB/UB | GF | No | No |
| 3050 | 107 | Fuels Only | SB/UB | GF, SV | No | 37 ac. |
| 3055 | 5 | Fuels Only | SB/UB | GF, OG | 4 ac. | No |
| 3060 | 91 | Fuels Only | SB/UB | GF, OG | 17 ac. | No |
| 3065 | 144 | Fuels Only | SB/UB | GF | No | No |
| 3070 | 68 | Fuels Only | SB/UB | GF | No | No |
| 3075 | 15 | Fuels Only | SB/UB | GF | No | No |
| 3080 | 43 | Fuels Only | SB/UB | GF | No | No |
| 3085 | 14 | Fuels Only | SB/UB | GF | No | No |
| 3090 | 14 | Fuels Only | SB/UB | GF | No | No |
| 3095 | 41 | Fuels Only | SB/UB | GF | No | No |
| 4000 | 16 | Fuels Only | SB/UB | GF | No | No |
| 4005 | 7 | Fuels Only | SB/UB | GF | No | No |
| 4010 | 27 | Fuels Only | SB/UB | OG | 27 ac. | No |
| 4015 | 13 | Fuels Only | SB/UB | OG | 13 ac. | No |
| 4020 | 60 | Fuels Only | SB/UB | GF, OG | 6 ac. | No |
| 4025 | 8 | Fuels Only | SB/UB | OG | No | No |
| 4030 | 78 | Fuels Only | SB/UB | GF, OG, SV | 2 ac. | No Foreground |
| 4035 | 153 | Fuels Only | SB/UB | OG | 153 ac. | No |
| 4040 | 146 | Fuels Only | SB/UB | GF, OG | 144 ac. | No |
| 4045 | 80 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 4050 | 292 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 4055 | 108 | Fuels Only | SB/UB | OG | 108 ac. | No |
| 4060 | 63 | Fuels Only | SB/UB | GF, OG, SV | 43 ac. | No Foreground |
| 4065 | 14 | Fuels Only | SB/UB | GF | No | No |
| 4070 | 62 | Fuels Only | SB/UB | GF | No | No |
| 4075 | 42 | Fuels Only | SB/UB | GF, OG | 36 ac. | No |
| 4080 | 11 | Fuels Only | SB/UB | GF | No | No |
| 4085 | 79 | Fuels Only | SB/UB | GF | No | No |
| 4090 | 7 | Fuels Only | SB/UB | GF | No | No |
| 4095 | 393 | Fuels Only | SB/UB | GF | No | No |
| 5000 | 58 | Fuels Only | SB/UB | GF | No | No |
| 5005 | 56 | Fuels Only | SB/UB | GF | No | No |
| 5010 | 9 | Fuels Only | SB/UB | GF | No | No |
| 5015 | 39 | Fuels Only | SB/UB | OG, SV | 1 ac. | No Foreground |
| 5020 | 18 | Fuels Only | SB/UB | OG, SV | 7 ac. | No Foreground |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[4] |
|---|---|---|---|---|---|---|
| 5025 | 19 | Fuels Only | SB/UB | SV | No | No Foreground |
| 5030 | 22 | Fuels Only | SB/UB | SV | No | No Foreground |
| 5035 | 408 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 5040 | 46 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 5045 | 35 | Fuels Only | SB/UB | SV | No | No Foreground |
| **Total unit acres for Alternative D =14,780** | | | | | | |

HIM = Harvest Improvement Cut
HTH = Harvest Commercial Thin
HSG = Harvest Group Selection
Aspen-Unit #621 only, to facilitate aspen regeneration
Fuels Only= Accomplished without a commercial timber sale. For units on Walker Rim, includes Small Diameter Thinning (SDT), hand piling (HP), and disposal. All other "Fuels Only" units are those ready for restoring to a frequent fire regime without any tree thinning. Activities include, slashbusting/brush mastication (SB) and prescribed underburning (UB)
GP = Grapple pile material, utilization of piles or disposal; or slash busting/mastication by machine with no pile disposal
UB = Prescribed underburning
SB = Slash busting (brush mastication) with no pile disposal or handpile with disposal in scenic areas
GF = General Forest
OG = Old Growth
SV = Scenic Views (Foreground and Middleground)

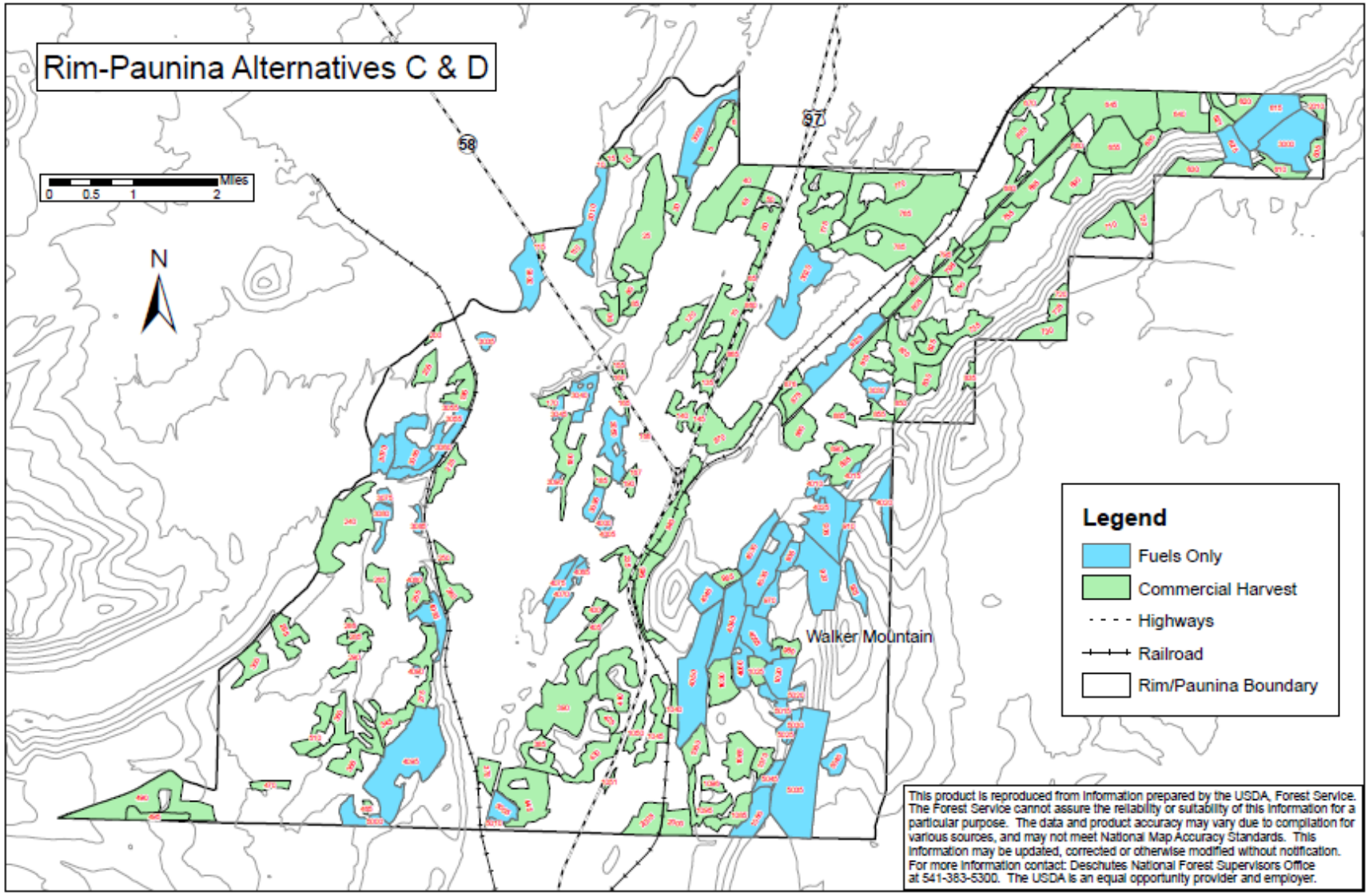



**Figure 3. Alternatives C and D Proposed Units within the Rim-Paunina Planning Area**

### Alternative E

Alternative E was developed to provide a different approach in response to Key Issue #2, addressing the gap-in-time for large trees to replace those lost by severe dwarf mistletoe infection. Instead of openings created by Alternative D in the most severely infected stands with dwarf mistletoe, this alternative would thin 1,921 acres and then use alternative methods to hasten the mortality of the overstory. All the largest trees 21 inches and greater would be retained. Also, within the overlap of severely infected stands and Old Growth Management Areas, those structurally advanced trees exhibiting fire and drought resistance would be retained regardless of tree size. To minimize the continued cycle of mistletoe infection, several techniques would be used to hasten the mortality of visibly infected trees[5] depending on site specific appropriateness:

- Prescribed fire or other methods (such as blasting or topping[6]) could be used to accelerate their mortality, providing recruitment for snags.
- Ecologically appropriate species of conifers that would not be susceptible to mistletoe infection from the overstory could be planted underneath.

Also, in response to Key Issue #1, this alternative provides more of a balance of habitat for Management Indicator Species, retaining 88 acres (in comparison to the proposed action) of ponderosa pine stands in a dense, multi-story condition. Alternative E also responds to Key Issue #3 by retaining 712 acres (in comparison to the proposed action) of decadent lodgepole pine stands to provide more of a balance between short and long-terms, by providing habitat for Management Indicator Species such as the black-backed woodpecker and the marten.

In response to Key Issue #4, return of a frequent fire regime in appropriate stands is also a component of this alternative, which includes 1,205 acres of small diameter thinning within the Old Growth Management Area on Walker Rim, handpiling, and disposal. Then, a low-intensity fire would be carefully applied to ready the stand for a frequent fire regime in a maintenance mode. This activity would be coded “Fuels Only” along with 3,780 acres of slashbusting/brush mastication and prescribed fire in stands that are ready for a frequent fire regime without a commercial timber sale, or small diameter thinning.

In order to restore much of the ponderosa pine stands to a condition that allows a frequent, low-intensity fire regime, big game cover was reassessed and engineered where it exists on the landscape and placed in the most logical and functional places where it can be sustained. In those subwatersheds that were most deficient, passively-managed patches or “retention areas” were increased above 15 percent in activity units to maintain a minimum of 30 percent hiding cover across the subwatershed. These retention areas would also provide more suitable habitat for other dependent MIS species beside big game.

This alternative is estimated to produce approximately 24.1 Million Board Feet (MMBF), of which approximately 70 percent would be in “saw logs.”

[5] Trees 21 inches and greater outside of designated Old Growth Management Areas and all trees retained within the Old Growth Management Area that are structurally advanced and exhibit fire and drought resistance regardless of size.

[6] Blasting or topping refers to removing the top of a live tree by mechanical methods, thereby creating a snag

**Table 9. Proposed Activities for Alternative E**

| Proposed Activities for Alternative E | Approximate Acres |
|---|---|
| Density reduction, or thinning, including commercial and non-commercial removal in ponderosa pine (HTH). | 5,244 |
| Improvement cutting primarily in lodgepole pine to enhance overall stand composition and quality (HIM). | 4,028 |
| Removal of all trees under 21 inches in the most severely infected stands plus activity-induced mortality to larger diameter trees which are a source of infection (AltMist). | 1,921 |
| Aspen Unit #621 | 43 |
| Disposal of activity-created slash without underburning. | 2,730 |
| Disposal of activity-created slash followed by prescribed underburning. | 8,506 |
| Brush mastication and/or application of prescribed "maintenance" burning outside of commercial harvest units. | 3,780 |
| Thin small diameter material, pruning of limbs, pile, dispose of piles, and then apply prescribed underburning. | 1,205 |

## Connected Actions

In order for Alternative E to implemented, the following are connected actions:

- About 8.3 miles of temporary roads to be constructed.

**Table 10. Alternative E Management Units**

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[7] |
|---|---|---|---|---|---|---|
| 5 | 77 | HTH | GP/UB | GF | No | No |
| 6 | 20 | HIM | GP | GF | No | No |
| 10 | 7 | HTH | GP/UB | GF | No | No |
| 15 | 16 | HIM | GP | GF | No | No |
| 20 | 30 | HIM | GP | GF | No | No |
| 25 | 306 | HTH | GP/UB | GF | No | No |
| 30 | 57 | HIM | GP/UB | GF | No | No |
| 40 | 197 | HIM | GP | GF | No | No |
| 45 | 70 | HIM | GP | GF | No | No |
| 50 | 17 | HIM | SB | GF, SV | No | 14 ac. |
| 55 | 31 | HIM | SB | SV | No | 31 ac. |
| 60 | 95 | HIM | SB | GF, SV | No | 87 ac. |
| 65 | 17 | HIM | SB | SV | No | 17 ac. |
| 70 | 176 | HTH | GP; SB in scenic/UB | GF, SV | No | 140 ac. |
| 80 | 48 | HIM | GP/UB | GF | No | No |
| 85 | 29 | HTH | GP/UB | GF | No | No |
| 90 | 47 | HIM | GP; SB in scenic/UB | GF, SV | No | 5 ac. |

[7] Only Scenic Views Foreground acres are shown is this column because they are affected by vegetative prescriptions prescribed in this project. Partial Retention Middleground acres are not shown.

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[7] |
|---|---|---|---|---|---|---|
| 95 | 74 | HTH | GP; SB in scenic | GF, SV | No | 30 ac. |
| 110 | 28 | HIM | GP | GF | No | No |
| 115 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 120 | 70 | HTH | GP/UB | GF | No | No |
| 125 | 31 | HIM | GP/UB | GF | No | No |
| 135 | 34 | HIM | SB/UB | GF, SV | No | 33 ac. |
| 140 | 55 | HIM | GP; SB in scenic | GF, SV | No | 31 ac. |
| 145 | 18 | HTH | SB/UB | SV | No | 18 ac. |
| 150 | 53 | HIM | SB | SV | No | 53 ac. |
| 155 | 13 | HIM | SB | SV | No | 13 ac. |
| 160 | 9 | HTH | SB/UB | SV | No | 9 ac. |
| 165 | 15 | HIM | SB | SV | No | 15 ac. |
| 166 | 7 | HIM | SB | SV | No | 7 ac. |
| 167 | 4 | HIM | GP/UB | GF | No | No |
| 170 | 26 | HIM | GP/UB | GF, OG | 3 ac. | No |
| 171 | 22 | HIM | GP | GF, OG | 1 ac. | No |
| 180 | 113 | HTH | GP/UB | GF | No | No |
| 185 | 24 | HTH | GP/UB | GF | No | No |
| 190 | 22 | HTH | GP/UB | GF | No | No |
| 195 | 82 | HTH | GP/UB | GF, OG | 67 ac. | No |
| 200 | 10 | HTH | GP/UB | GF, OG | 9 ac. | No |
| 205 | 50 | HTH | GP/UB | GF, OG | 48 ac. | No |
| 215 | 15 | HIM | GP | GF | No | No |
| 220 | 23 | HIM | GP/UB | GF | No | No |
| 225 | 65 | HIM | GP | GF, OG | 1 ac. | No |
| 235 | 52 | HIM | SB | GF, SV | No | 48 ac. |
| 240 | 250 | AltMist | GP/UB | GF | No | No |
| 245 | 24 | HIM | GP | GF | No | No |
| 250 | 23 | HIM | GP | GF | No | No |
| 255 | 52 | HTH | GP/UB | GF | No | No |
| 260 | 65 | HIM | GP | GF | No | No |
| 265 | 49 | HIM | GP | GF | No | No |
| 270 | 55 | HIM | GP | GF | No | No |
| 275 | 98 | HTH | GP/UB | GF | No | No |
| 285 | 29 | HIM | GP/UB | GF | No | No |
| 286 | 12 | HIM | GP/UB | GF | No | No |
| 290 | 57 | HTH | GP/UB | GF | No | No |
| 295 | 80 | HIM | GP/UB | GF | No | No |
| 300 | 72 | HTH | GP/UB | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[7] |
|---|---|---|---|---|---|---|
| 310 | 113 | HIM | GP | GF | No | No |
| 330 | 70 | HIM | GP | GF | No | No |
| 345 | 68 | HTH | GP/UB | GF | No | No |
| 350 | 79 | HTH | GP/UB | GF | No | No |
| 355 | 123 | HIM | GP | GF | No | No |
| 370 | 51 | HTH | GP/UB | GF | No | No |
| 385 | 68 | HTH | GP/UB | GF | No | No |
| 390 | 300 | HTH | GP/UB | GF | No | No |
| 400 | 26 | HTH | GP; SB in scenic/UB | GF, SV | No | 1 ac. |
| 405 | 43 | HTH | GP; SB in scenic/UB | GF, SV | No | 6 ac. |
| 410 | 143 | HTH | GP; SB in scenic/UB | GF, SV | No | 75 ac. |
| 415 | 64 | HIM | GP; SB in scenic | GF, SV | No | 51 ac. |
| 425 | 33 | HTH | GP; SB in scenic/UB | GF, SV | No | 21 ac. |
| 430 | 101 | HTH | GP; SB in scenic/UB | GF, SV | No | 67 ac. |
| 445 | 190 | HTH | GP/UB | GF | No | No |
| 460 | 13 | HIM | GP | GF | No | No |
| 465 | 9 | HTH | GP/UB | GF | No | No |
| 470 | 29 | HIM | GP/UB | GF | No | No |
| 480 | 85 | HIM | GP | GF | No | No |
| 490 | 266 | HIM | GP | GF | No | No |
| 495 | 47 | HIM | GP | GF | No | No |
| 510 | 66 | HIM | GP | GF | No | No |
| 605 | 26 | HTH | GP/UB | OG | 26 ac. | No |
| 610 | 48 | HIM | GP | GF, OG | 3 ac. | No |
| 615 | 182 | Fuels Only | SDT/HP/UB | OG | 181 ac. | No |
| 620 | 65 | AltMist | GP/UB | OG | 65 ac. | No |
| 621 | 43 | Aspen | GP/UB | GF, OG | 39 ac. | No |
| 625 | 76 | Fuels Only | SDT/HP/UB | GF, OG | 66 ac. | No |
| 630 | 68 | HTH | GP/UB | GF, OG | 4 ac. | No |
| 640 | 166 | HIM | GP/UB | GF, OG | 10 ac. | No |
| 645 | 296 | HIM | GP | GF | No | No |
| 650 | 58 | AltMist | GP/UB | GF, OG | 4 ac. | No |
| 655 | 178 | HTH | GP/UB | GF | No | No |
| 660 | 14 | HIM | GP | GF | No | No |
| 665 | 214 | HTH | GP/UB | GF | No | No |
| 670 | 38 | HIM | GP | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[7] |
|---|---|---|---|---|---|---|
| 675 | 52 | HIM | GP | GF | No | No |
| 680 | 58 | HTH | GP/UB | GF | No | No |
| 685 | 121 | AltMist | GP/UB | GF | No | No |
| 690 | 123 | AltMist | GP/UB | GF, OG | 118 ac. | No |
| 700 | 67 | HIM | GP/UB | GF, OG | 3 ac. | No |
| 710 | 105 | HIM | GP/UB | GF, OG | 1 ac. | No |
| 720 | 17 | HTH | GP/UB | GF | No | No |
| 725 | 32 | HTH | GP/UB | GF | No | No |
| 730 | 73 | HIM | GP | GF, SV | No | No Foreground |
| 735 | 67 | AltMist | GP/UB | GF, SV | No | No Foreground |
| 740 | 339 | HIM | GP/UB | GF, OG | 318 ac. | No |
| 745 | 168 | HIM | GP/UB | GF, OG | 153 ac. | No |
| 750 | 95 | AltMist | GP/UB | GF | 1 ac. | No |
| 755 | 106 | AltMist | GP/UB | GF | No | No |
| 765 | 408 | HTH | GP/UB | GF | No | No |
| 770 | 113 | AltMist | GP/UB | GF | No | No |
| 775 | 235 | AltMist | GP; SB in scenic/UB | GF, SV | No | 18 ac. |
| 785 | 127 | AltMist | GP/UB | GF | No | No |
| 786 | 86 | HTH | GP/UB | GF | No | No |
| 795 | 22 | HTH | GP/UB | GF | No | No |
| 796 | 40 | HTH | GP/UB | GF | No | No |
| 800 | 69 | AltMist | GP/UB | GF | No | No |
| 805 | 57 | AltMist | GP/UB | GF | No | No |
| 810 | 149 | HTH | GP/UB | GF | No | No |
| 815 | 92 | HTH | GP/UB | GF | No | No |
| 820 | 164 | AltMist | GP/UB | GF | No | No |
| 825 | 68 | AltMist | GP/UB | GF | No | No |
| 830 | 60 | HTH | GP/UB | GF, SV | No | No Foreground |
| 835 | 18 | HTH | GP/UB | SV | No | No Foreground |
| 850 | 27 | AltMist | GP/UB | GF, SV | No | No Foreground |
| 855 | 33 | AltMist | GP/UB | GF, SV | No | No Foreground |
| 860 | 9 | HIM | SB/UB | SV | No | 9 ac. |
| 865 | 51 | HTH | SB/UB | SV | No | 51 ac. |
| 870 | 145 | HTH | GP; SB in scenic/UB | GF, SV | No | 64 ac. |
| 875 | 57 | HTH | GP/UB | GF | No | No |
| 876 | 40 | HTH | GP/UB | GF | No | No |
| 880 | 84 | HTH | GP/UB | GF | No | No |
| 885 | 30 | AltMist | GP/UB | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[7] |
|---|---|---|---|---|---|---|
| 890 | 21 | AltMist | GP/UB | GF | No | No |
| 895 | 92 | AltMist | GP/UB | GF, OG | 92 ac. | No |
| 905 | 173 | Fuels Only | SDT/HP/UB | OG | 173 ac. | No |
| 910 | 47 | Fuels Only | SDT/HP/UB | GF, OG | 46 ac. | No |
| 925 | 47 | Fuels Only | SDT/HP/UB | GF, SV | No | No Foreground |
| 930 | 199 | Fuels Only | SDT/HP/UB | GF, OG | 198 ac. | No |
| 935 | 37 | Fuels Only | SDT/HP/UB | OG | 37 ac. | No |
| 940 | 150 | HIM | SB/UB | SV | No | 150 ac. |
| 945 | 106 | HIM | SB/UB | GF, SV | No | 99 ac. |
| 965 | 33 | HTH | GP/UB | SV | No | No Foreground |
| 970 | 49 | Fuels Only | SDT/HP/UB | OG | 49 ac. | No |
| 975 | 41 | HTH | GP | OG | 41 ac. | No |
| 980 | 37 | HTH | GP/UB | OG, SV | 22 ac. | No Foreground |
| 1020 | 86 | Fuels Only | SDT/HP/UB | OG, SV | 63 ac. | No Foreground |
| 1025 | 38 | HTH | GP/UB | OG, SV | 20 ac. | No Foreground |
| 1030 | 97 | HTH | GP/UB | GF, OG, SV | 55 ac. | No Foreground |
| 1040 | 28 | HIM | GP | GF | No | No |
| 1045 | 105 | HTH | GP; SB in scenic/UB | GF, SV | No | 44 ac. |
| 1050 | 38 | HIM | SB/UB | SV | No | 38 ac. |
| 1051 | 7 | HIM | SB | SV | No | 7 ac. |
| 1060 | 66 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1065 | 102 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1070 | 43 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1080 | 92 | Fuels Only | SDT/HP/UB | GF, SV | No | No Foreground |
| 1085 | 70 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1090 | 20 | HIM | GP | GF | No | No |
| 1095 | 74 | HTH | GP/UB | GF, SV | No | No Foreground |
| 1096 | 24 | HTH | GP/UB | GF, SV | No | No Foreground |
| 2000 | 72 | HTH | GP | GF | No | No |
| 2005 | 83 | HTH | GP | GF | No | No |
| 2010 | 38 | HTH | GP/UB | OG | 37 ac. | No |
| 3000 | 219 | Fuels Only | SDT/HP/UB | GF, OG | 140 ac. | No |
| 3005 | 138 | Fuels Only | SB/UB | GF | No | No |
| 3010 | 127 | Fuels Only | SB/UB | GF | No | No |
| 3015 | 127 | Fuels Only | SB/UB | GF, SV | No | 110 ac. |
| 3020 | 206 | Fuels Only | SB/UB | GF | No | No |
| 3025 | 142 | Fuels Only | SB/UB | GF | No | No |
| 3030 | 37 | Fuels Only | SB/UB | GF | No | No |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[7] |
|---|---|---|---|---|---|---|
| 3035 | 20 | Fuels Only | SB/UB | GF | No | No |
| 3040 | 55 | Fuels Only | SB/UB | GF, SV | No | 17 ac. |
| 3045 | 18 | Fuels Only | SB/UB | GF | No | No |
| 3050 | 107 | Fuels Only | SB/UB | GF, SV | No | 37 ac. |
| 3055 | 5 | Fuels Only | SB/UB | GF, OG | 4 ac. | No |
| 3060 | 91 | Fuels Only | SB/UB | GF, OG | 17 ac. | No |
| 3065 | 144 | Fuels Only | SB/UB | GF | No | No |
| 3070 | 68 | Fuels Only | SB/UB | GF | No | No |
| 3075 | 15 | Fuels Only | SB/UB | GF | No | No |
| 3080 | 43 | Fuels Only | SB/UB | GF | No | No |
| 3085 | 14 | Fuels Only | SB/UB | GF | No | No |
| 3090 | 14 | Fuels Only | SB/UB | GF | No | No |
| 3095 | 41 | Fuels Only | SB/UB | GF | No | No |
| 4000 | 16 | Fuels Only | SB/UB | GF | No | No |
| 4005 | 7 | Fuels Only | SB/UB | GF | No | No |
| 4010 | 27 | Fuels Only | SB/UB | OG | 27 ac. | No |
| 4015 | 13 | Fuels Only | SB/UB | OG | 13 ac. | No |
| 4020 | 60 | Fuels Only | SB/UB | GF, OG | 6 ac. | No |
| 4025 | 8 | Fuels Only | SB/UB | OG | 8 ac. | No |
| 4030 | 78 | Fuels Only | SB/UB | GF, OG, SV | 2 ac. | No Foreground |
| 4035 | 153 | Fuels Only | SB/UB | OG | 153 ac. | No |
| 4040 | 146 | Fuels Only | SB/UB | GF, OG | 144 ac. | No |
| 4045 | 80 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 4050 | 292 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 4055 | 108 | Fuels Only | SB/UB | OG | 108 ac. | No |
| 4060 | 63 | Fuels Only | SB/UB | GF, OG, SV | 43 ac. | No Foreground |
| 4065 | 14 | Fuels Only | SB/UB | GF | No | No |
| 4070 | 62 | Fuels Only | SB/UB | GF | No | No |
| 4075 | 42 | Fuels Only | SB/UB | GF, OG | 36 ac. | No |
| 4080 | 11 | Fuels Only | SB/UB | GF | No | No |
| 4085 | 79 | Fuels Only | SB/UB | GF | No | No |
| 4090 | 6 | Fuels Only | SB/UB | GF | No | No |
| 4095 | 393 | Fuels Only | SB/UB | GF | No | No |
| 5000 | 58 | Fuels Only | SB/UB | GF | No | No |
| 5005 | 55 | Fuels Only | SB/UB | GF | No | No |
| 5010 | 9 | Fuels Only | SB/UB | GF | No | No |
| 5015 | 39 | Fuels Only | SB/UB | OG, SV | 1 ac. | No Foreground |
| 5020 | 18 | Fuels Only | SB/UB | OG, SV | 7 ac. | No Foreground |

| Unit | Total Acres in Unit | Veg Rx | Fuels Rx | MGMT | OG Acres | Scenic Views[7] |
|---|---|---|---|---|---|---|
| 5025 | 19 | Fuels Only | SB/UB | SV | No | No Foreground |
| 5030 | 22 | Fuels Only | SB/UB | SV | No | No Foreground |
| 5035 | 408 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 5040 | 46 | Fuels Only | SB/UB | GF, SV | No | No Foreground |
| 5045 | 35 | Fuels Only | SB/UB | SV | No | No Foreground |
| **Total unit acres for Alternative E = 16,221** | | | | | | |

HIM = Harvest Improvement Cut
HTH = Harvest Commercial Thin
AltMist = Alternative Mistletoe
Aspen - Unit #621 only, to facilitate aspen regeneration
Fuels Only= Accomplished without a commercial timber sale. For units on Walker Rim, includes Small Diameter Thinning (SDT), hand piling (HP), and disposal. All other "Fuels Only" units are those ready for restoring to a frequent fire regime without any tree thinning. Activities include slashbusting/brush mastication (SB) and prescribed underburning (UB).
GP = Grapple pile material, utilization of piles or disposal; or slash busting/mastication by machine with no pile disposal
UB = Prescribed underburning
SB = Slash busting (brush mastication) with no pile disposal or handpile with disposal in scenic areas
GF = General Forest
OG = Old Growth
SV = Scenic Views (Foreground and Middleground)

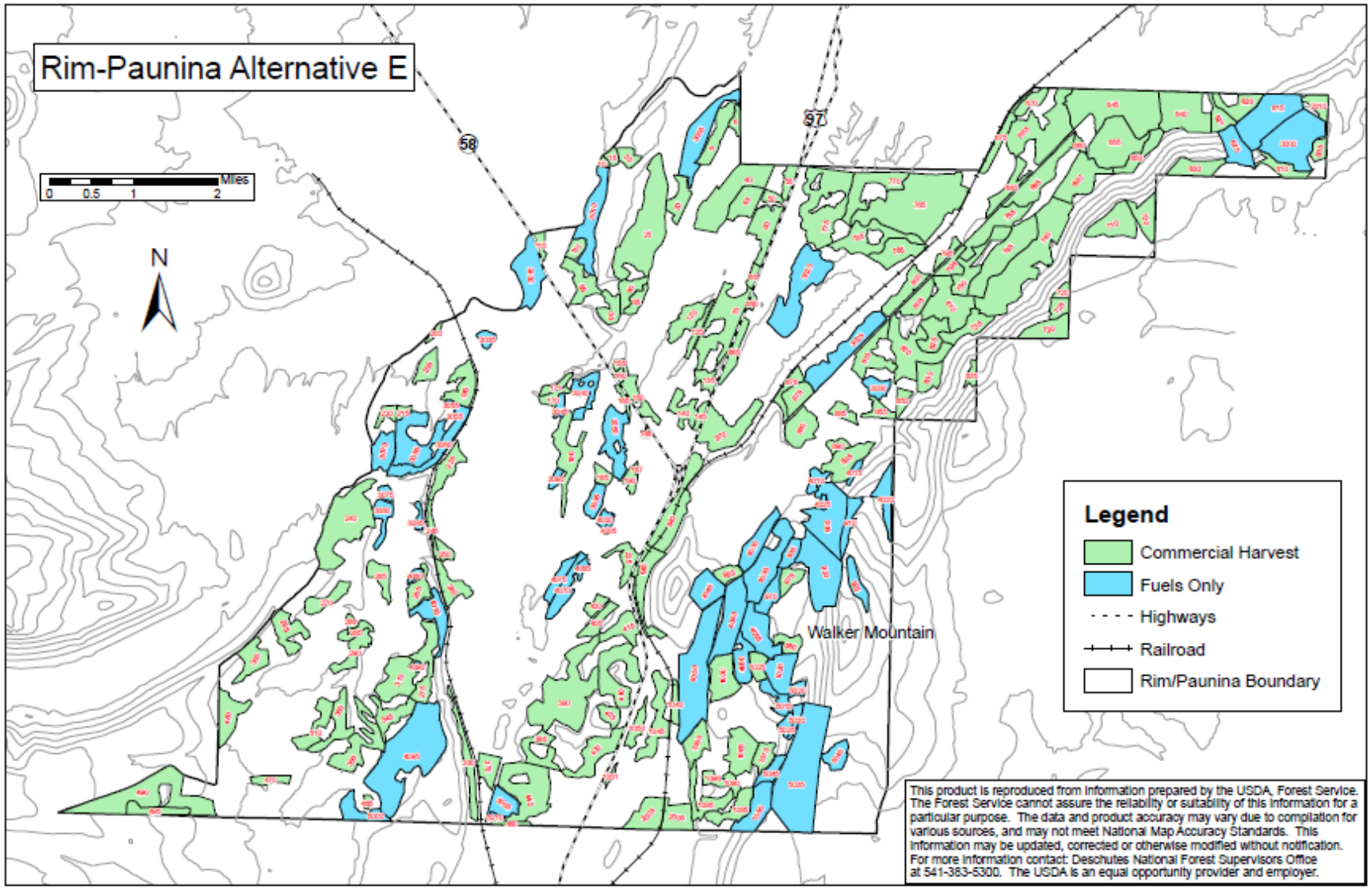



**Figure 4. Alternative E Proposed Units within the Rim-Paunina Planning Area**

# Resource Protection Measures

## Project Design Features Common to All Action Alternatives

The following features are incorporated into the design of all activities included in the Rim-Paunina project. The difference between these design features and mitigation measures is that these are considered routine, have been used on numerous similar projects, and are either incorporated into contract provisions or accomplished between appropriate resource specialists, and have proven to be effective. Mitigation measures are site-specific, usually have a specific unit(s) assigned to them, and are used to avoid, minimize, rectify, reduce, or compensate an impact (40 CFR 1508.20). For example, a Project Design Feature may include a seasonal closure for an unknown nest site (if discovered); a mitigation measure would place a seasonal closure on a known nest site specific to a unit. Project Design Features and mitigation measures are used as a basis for determining and disclosing effects in the Environmental Consequences discussions.

**Vegetation Management**

- Commercial material would be thinned and removed using harvest methods that ensure soil productivity and minimal damage to residual trees. Since the commercial market fluctuates widely, a precise division between small tree and commercial products is not defined within this document. Implementation of this project would utilize the smallest materials the commercial market would bear at the time of implementation. For removal of these special forest products, a conservative estimate for additional soil disturbance was factored in; however existing skid trails and disturbed areas would be utilized where feasible. Also, no additional access above what was needed for the harvest operation would be required.

- The diversity of species on the site would be retained, though the proportion of one species over another may change considerably. Generally, the preference for conifer species to retain is (from highest to lowest): Douglas-fir, sugar pine, western white pine, ponderosa pine, Shasta red fir, mountain hemlock, white fir/grand fir, and lodgepole pine. These preferences may vary on specific sites depending on the abundance of a given species, presence of pathogens, vegetative potential, and/or site-specific objectives.

- Structural diversity and spatial heterogeneity would be clearly maintained on the landscape, but may not be very diverse in a given activity unit. This means some individual areas may be single-storied, others two-storied, and still others with more canopy layers.

- Trees of high value to wildlife would remain on site. Examples include, but are not limited to, true fir with conks that would indicate a future hollow log, non-lodgepole trees with multiple tops, trees with very large limbs, etc.

- Late and old seral and/or structural trees greater than or equal to 21 inches in diameter (Eastside Screens, Scenario A, 2(a)) would be retained, except in approximately 778 acres of openings to be created in Alternative D.

- Except in Alternative D, those structurally advanced trees exhibiting fire and drought resistance would be retained regardless of tree size or level of infection to provide for one of the goals of Management Area 15: "…naturally evolved old growth forest ecosystems (Forest Plan 4-149)."

Generally, the bark plate widths of these trees are approximately 15 centimeters (6 inches) in width and more than three times wider than the darker fissures that separate them[8].

- Activities applied to the landscape, such as a return to a proper fire return interval in ecologically appropriate plant association groups would be maintained through time to optimize diversity and juxtaposition of habitats.

- In addition to retention of passively-managed patches across the landscape, silviculture prescriptions and prescribed burning plans would incorporate features that provide for spatial heterogeneity.

- All activities would take advantage of opportunities resulting from vegetation management activities that offset costs and provide products to stimulate the economy.

**Soil and Water Quality**

- If site specific investigation determines soils that are mapped for seasonally wet are inaccurate, then restrictions on mechanical methods may be lifted.

- The Riparian Management Objective is to maintain the unique values associated with wet meadow habitats in the Five Mile Draw area. Non-fish bearing streams and ephemeral streams would have one standard tree height or 150 feet no-harvest buffer placed on either side of the stream except for those units specifically designed for riparian enhancement and restoration activities (units listed below). To accomplish this, some dead and downed material, as well as encroaching lodgepole pine would need to be removed ("Exceptions" TM-1a and b, INFISH A-7). Mechanized equipment would be restricted to the edge of the soils within the draw mapped as sensitive.

  **Alternative B**: 15, 20, 25, 35, 240, 285, 286, 355, 610
  **Alternatives C, D, and E**: 15, 20, 25, 240, 285, 286, 355, 610

- Meadow, wet draw restoration activities for the Five Mile Draw area includes removal of small encroaching lodgepole pine and removal of downed material where appropriate.

- There would be no use of tracked mechanized equipment associated with harvest operations on any wetted soils; permanent or seasonally. Storage and refueling requirements and other intoxicants for equipment are regulated by contract provision and would occur outside of RHCAs (INFISH RA-4).

- Best Management Practices (BMPs) (USDA 1988) apply. Specific BMPs are for Timber Management (pp. 1-21), Road Systems (pp. 22-42), Fire Suppression and Fuels Management (pp.43-47), Watershed Management (pp. 48-55), and Vegetative Manipulation (pp. 71-73). These practices maintain the physical integrity of the aquatic system and in cooperation with the State of Oregon, are required to be followed in accordance with the Clean Water Act. For a complete list, see Appendix A, Management Direction.

- When designating access for harvest operations, utilize previously disturbed areas whenever possible. Assure that water control structures are installed and maintained on skid trails that have

[8] Robert Van Pelt, 2008, *Identifying Mature and Old Forests in Western Washington* and *Identifying Old Trees and Forests in Eastern Washington*

gradients of 10 percent or more. Ensure that 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).

- Minimize potential erosive effects of concentrated water through the proper design and construction of temporary roads (Road BMP R-7).

- Conduct regular preventive maintenance to avoid deterioration of the road surface and minimize the effects of erosion (Road BMP R-18, R-19).

- Retain adequate supplies of large woody debris (greater than 3-inches in diameter) to provide organic matter reservoirs for nutrient cycling following completion of all project activities (LRMP SL-1). A minimum of 5 to 10 tons per acre of woody debris be retained on dry, ponderosa pine sites to help maintain long-term site productivity.

- The objective is to maintain existing sources of unburned or partially consumed, fine organic matter (organic materials less than 3-inches in diameter; commonly referred to as the duff layer) over a minimum of 50 percent of the prescribed burn unit (LRMP SL-6; Fuels Management BMP F-2; Timber Management BMP T-13).

- Maintain spacing of 100 to 150 feet for all primary (main) skid trail routes, except where they converge at landings. If closer spacing is necessary due to complex terrain, the Timber Sale Administrator must provide advance approval. Main skid trails spaced 100 feet apart will maintain soil quality on 89 percent of the unit area. For 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 maintain soil quality on 93 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 and to achieve soil management objectives.

- Reclaim all temporary roads by applying appropriate rehabilitation treatments (such as the use of subsoiling equipment to loosen compacted soils) where detrimental soil conditions are expected to exceed the Regional Policy guidelines.

- Restrict skidders and tractors to designated areas (i.e. roads, landings, designated skid trails), and limit the amount of traffic from other specialized equipment off designated trails. Harvester shears would be authorized to operate off designated skid trails, at appropriate intervals, and make no more than two equipment passes[9] on any site specific area to accumulate materials.

- No sharp turning off of the skid trail for slashbusting machinery to minimize natural resource damage.

[9] A pass of a machine is defined as off the skid trail, cutting and accumulating material, and then traveling back to the skid trail to place the material

- Avoid equipment operations during periods of high soil moisture, as evidenced by equipment tracks that sink deeper than during dry or frozen conditions. An indication of potential detrimental disturbance would be identifiable when ruts, or indentations in the ground after equipment travel appears six inches in depth or greater.

- Prevent additional soil effects 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. Machine piling equipment must stay on existing skid trails and landings because of lack of effects associated with slashbusting/mowing equipment. It would be allowed off of skid trails and landings for one pass.

- On steep pitches (slopes of 30 percent or steeper) less than 100 feet long, equipment will be permitted to make one pass out and one pass back to harvest trees. In other areas, directional felling of trees to skid trails and /or line pulling should be utilized to harvest trees. This method applies to units that have a small amount of slopes over 30 percent in less than 10 percent of the unit area.

**Wildlife**

- Fifteen (15) percent of each unit, regardless of management allocation would be retained in an unmanaged condition averaged across the total of activity units within a subwatershed to provide strategic wildlife habitat and take advantage of lumping retention areas to increase their size and/or distribution. The areas would be positioned in a manner to accommodate prescribed fire within ecologically appropriate plant association groups. Using this strategy, some smaller activity units that are planned for return of a frequent fire regime may not be feasible to maintain retention areas over time; however larger units could have more than 15 percent retention[10] areas with larger patches. They would retain desired site characteristics such as dense multi-storied pockets, accumulations of snags and down logs, and the largest available healthy live trees, unique habitats (rock outcrops and mixed conifer/hardwood stands). They also would be used to retain other unique and desired resources such as cultural heritage sites, developed water sources (guzzlers), or wildlife connectivity corridors.

- Seasonal restrictions on all occupied wildlife habitat sites identified in this EIS would be placed as described in Table 11. Activities that may disturb each species would be determined by a qualified wildlife biologist, but generally include timber hauling, timber harvest, temporary road construction, small tree thinning, prescribed slash burning, and underburning operations. Seasonal restrictions may be waived in a given year if a wildlife biologist determines the species is in a non-nesting status, had a nest failure, or that the habitat is not occupied; waivers are only valid until the beginning of the next breeding season. There are no known Threatened or Endangered wildlife species within the project area. However, if new occupied habitats are discovered during sale layout or implementation of the Rim-Paunina Project, contract provisions are in place to halt operations for Threatened and Endangered species. For all other species, the Forest Service would negotiate with the purchaser or amend the timber sale contract in order to follow related Forest Plan Standards and Guidelines.

[10] All severely infected trees within/up to 800 acres of ‘openings’ would be removed. Activities that overlap Old Growth Management Areas especially in Alternative E subwatersheds that have an additional need for cover.

**Table 11. Seasonal Restrictions on Disturbing Activities near Active Nest Sites, Wolverine Dens and Big Game Calving/Fawning Habitat**

| Species | Buffer Distance | Restricted Season |
|---|---|---|
| Northern spotted owl (nest) | ¼ mile (most activities) or ½ mile | March 1 –August 31 |
| Northern bald eagle (nest) | ½ mile (line-of-sight) or ¼ (non line-of-sight) | January 1 – August 31 |
| Bald eagle (winter roost) | To be determined by a wildlife biologist | November 1 – April 30 |
| Golden eagle (nest) | ¼ mile | February 1 – July 31 |
| Goshawk (nest) | ¼ mile | March 1- August 31 |
| Osprey (nest) | ¼ mile | April 1 – August 31 |
| Red-tailed hawk (nest) | ¼ mile | March 1 – August 31 |
| Sharp-shinned hawk (nest) | ¼ mile | April 15 – August 31 |
| Cooper's hawk (nest) | ¼ mile | April 1 – August 31 |
| Great gray owl (nest) | ¼ mile | March 1 – June 30 |
| Great blue heron (nest) | ¼ mile | March 1 – August 31 |
| Wolverine (den) | 2 miles | February 1 – May 30 |
| Deer and Elk (fawning/calving habitat) | To be determined by wildlife biologist | May 1 – June 30 |

- If sharp-shinned, Cooper's hawk or goshawk nests are discovered during layout, then temporary road construction will be located outside of nest stands (LRMP WL-27, 18, and 10). A Cooper's hawk nest is currently located in Unit 4045, which is proposed for treatment in Alternatives C, D, and E.

- If a sharp-shinned, Cooper's hawk, or goshawk nest is discovered during project layout, a forested stand of at least 10 acres would be retained for sharp-shins (LRMP WL-25), 15 acres for Cooper's (LRMP WL-17), and 25 acres for goshawks (LRMP WL-9). A Cooper's hawk nest is currently located in Unit 4045, which is proposed for treatment in Alternatives C, D, and E. If a goshawk nest is discovered, seasonal restrictions on activities near the nest will be required for activities that may disturb or harass the pair while bonding or nesting. Thirty (30) acres of the most suitable nesting habitat surrounding the nest will be deferred from harvest. A 400-acre post fledgling area (PFA) would be established. While harvest activities can occur within this area, the prescription will retain LOS stands and enhance younger stands towards LOS conditions, if possible (Interim Wildlife Standard Scenario A, 5).

- If a great gray owl nest is discovered during Rim-Paunina layout, a forested stand of at least 30 acres will be maintained around the nest site (LRMP WL-31).

- Active red-tailed hawk nests would be protected by maintaining the forested character of the area at least 300 feet in radius around the nest. Timber management may occur within this area, but must maintain an average of four dominant overstory trees per acre suitable for nest and perch trees. Ponderosa pine would be favored where available (LRMP WL-2). Currently, the following units are known to contain, or are within a ¼ mile of a red-tailed hawk nest. These nests sites would be assessed for activity before proceeding with activity in a unit:

  **Alternative B**: 5, 6, 665, 685, 690, 775, 800, 805, 875, 876, 880, 945
  **Alternatives C, D, and E**: 5, 6, 665, 685, 690, 775, 800, 805, 875, 876, 880, 905, 930, 945, 3005, 3010, 3020, 3025, 4025, 4030, 4035

- To protect potential bat habitat, restrict all project activities (such as timber harvest, vegetation removal and underburning operations) on lava pressure ridges greater than or equal to 100 square feet in size.

- All rock outcroppings and lava pressure ridges greater than 100 square feet found during unit layout would have directional felling and restrictions for mechanized equipment to protect potential bat roosting and maternity areas.

**Wildlife/Snags**

- All existing snags (any species) would remain except where snags must be felled for temporary and Maintenance Level 1 roads, log landings, or occupational safety. Harvest operations would be designed to avoid snags by locating skid trails and landings away from them, where possible. If snags need to be felled, they are to be retained for down wood. Felled snags may be moved off roads and landings, but not removed from the site. In addition, mistletoe infection and resultant mortality is expected to provide snag recruitment in many places across the Rim-Paunina analysis area. However, if an area has been determined to be deficient as indicated by pre-sale tally, sufficient live trees would be retained to create snags as funding is available.

- In stands currently below desired snag levels (Table 12) as determined by pre-sale tally, sufficient live trees would be retained to create snags. Snag creation to increase snag densities would take place as funding is available. Note: These levels exceed minimum requirements specified in the Eastside Screens.

**Table 12. Minimum Snag Levels to Determine Snag Creation**

| Location | PAG[11] | Snag Densities and Diameters |
|---|---|---|
| East of the NSO Line | PP | 2.25 snags/acre > 15” dbh with 0.14 snags/acre > 20” dbh |
| | MC | 2.25 snags/acre > 15” dbh with 0.14 snags/acre > 20” dbh |
| | LP | 1.80 snags/acre > 10” dbh with 0.59 snags/acre > 20” dbh |

**Wildlife/Down Wood**

- **Down wood requirements in all units except areas of potential firewood:** The intent is to retain all existing levels of down wood eight inches and greater in lodgepole pine and nine inches and greater in all other Plant Association Groups[12]. Only activity-created slash below these maximum diameters would be piled and utilized or disposed. Retain 2-3 piles per acre. Minimum pile size is 15 feet by 15 feet by 10 feet in grapple pile units. The maximum pile size is 6 feet by 6 feet by 4 feet in handpile units. This requirement can be waived if site-specific monitoring determines adequate levels of down wood are met in all units regardless of location (Table 13). While retaining down wood in place is preferred, it is recognized that some manipulation may be needed to meet stand prescription objectives. In all units, down wood may be manipulated (shifted, clumped, grouped, driven over, etc.) only as necessary to meet objectives. In all units, if sufficient size classes are not present, then the largest available down logs would be substituted.

- In Units 80 and 85 only, down wood may be removed to facilitate meeting stand prescriptions; however there would be high-density patches left in pockets to approximate densities per Table 13.

[11] MH= mountain hemlock, PP= ponderosa pine, LP = lodgepole pine, MC = mixed conifer
[12] Minimum down wood requirements are Plant Association Group specific for dependent wildlife species.

- Wherever possible, cull material greater than or equal to nine inches in diameter would be retained in the unit and not moved to landings.

- Live trees not intended for removal but damaged during vegetation management activities would remain standing if they do not pose a safety risk to forest workers. If they are felled, they would remain on site and retained for down wood.

**Table 13. Minimum Down Wood Levels**

| Species | Tons per Acre | Diameter Small end | Whole Tree Equivalent | Percent Cover |
|---|---|---|---|---|
| Lodgepole Pine | 7-42 | 8 inches | 17-105 Whole Trees 8-12 inches in diameter | 2.6-15.9 |
| Stands Dominated by Ponderosa Pine | 12-23 | 9 inches | 11-16 Whole Trees 16-22 inches in diameter | 2.8-5.2 |
| Ponderosa Pine Stands Where Lodgepole Pine Comprises Most Down Wood | Not specified in this plant association | 9 inches | 8-10 Whole Trees Largest LP on Site Plus Retain all Other Species | 0.1-0.3 in lodgepole |
| Mixed Conifer | 11-42 | 9 inches | 11-38 Whole Trees 16-22 inches in diameter | 2.6-10 |

**Personal Use Firewood**

- **Requirements in areas of potential firewood:** Meet or exceed minimum levels specified in Table 12 and Table 14.

- No snag falling would be allowed in personal use firewood areas.

- Firewood units would be subject to the same seasonal restrictions as the timber and fuels units (ie. calving/fawning, raptor closures) in Table 11.

***Potential Firewood Units***

**Alternatives B, C, D:** 10, 15, 20, 155, 160, 166, 190, 370, 385, 425, 430, and 870
**Alternative E:** 15, 20, 150, 155, 160, 166, 190, 370, 385, 425, 430, and 870

- Personal use and/or commercial firewood removal would not be permitted within designated Old Growth Management Areas that overlap units: 620, 650, 690 and 895.

**Table 14. Deschutes National Forest Plan Standards for Down Wood in Potential Firewood Units**

| East of the NSO Range Line (Eastside Screens) | | | | |
|---|---|---|---|---|
| **Vegetative Series** | **Pieces per Acre** | **Diameter Small End** | **Piece Length** | **Total Lineal Length** |
| PP | 3-6 | 12” | >6 feet | 20-40 feet |
| MC | 15-20 | 12” | >6 feet | 100-140 feet |
| LP | 15-20 | 8” | >8 feet | 120-160 feet |

**Slash Disposal/Prescribed Burning Operations**

- Slash disposal using prescribed fire would be accomplished during the cool and moist seasons of spring and fall.

- Prescribed burning would be accomplished in a mosaic pattern across the landscape with unburned areas within the burn, in addition to unburned designated leave areas, with the goal of leaving at least 25 percent shrub cover.

- To maintain a quality camping and hunting experience, during the green dot road closure period associated with two-week rifle deer season, prescribed burning would be suspended in the immediate vicinity of designated campgrounds, including Boundary Springs.

- To concurrently meet wildlife objectives for retention of larger dead wood and fuel objectives for reduction of large fire risk, burn prescriptions and fuels moistures should be such that snags greater than 15 inches in diameter and down wood greater than 12 inches in diameter at the large end would be protected. It is assumed that reduction of snags and down wood less than nine inches is most effective in reducing rate of fire spread. Grapple and hand piles would not include material greater than nine inches in all plant associations, instead it would be retained.

- If snag and down wood diameters do not meet objectives within a unit, the largest material available would be retained. Within the Eastside Screens, fire prescription parameters will ensure that consumption will not exceed three inches total (1.5 inches per side) in featured log sizes in Table 2-7 (Interim Direction Scenario A, 2).

- Burning operations would be utilized to create snags, where deficiencies occur.

- In order to reduce risk to motorists from reduced visibility as a result of fuel hazard abatement activities, limit disposal of slash directly adjacent to the highways to methods that do not include prescribed fire. Acceptable methods may include hauling piles away, or mastication (e.g. "slash buster").

- Prescribed fire managers would use smoke management forecasts in order to minimize smoke from fuels reduction activities from entering into places where smoke is undesirable, including Class 1 airsheds and designated areas, as well as sensitive wildlife habitat areas such as spotted owl nesting habitat and potential bat roosting areas.

- Smoke from application of prescribed fire has the potential to overlap the designated motorized trail system from the Three Trails OHV Project. In order to minimize potential exposure and maintain a positive rider experience, utilize public contact and sign affected trail systems and staging areas. If application of prescribed fire directly overlaps a portion of the main trail system, then that system would be closed until the prescribed maintenance burning as been completed.

- Within and adjacent to units with rock outcroppings and/or lava pressure ridges, all prescribed burning would be seasonally restricted to the fall months when bats are more fit and able to survive potential disturbance associated with smoke. A district wildlife biologist would also determine buffer distances which may range from 50-300 feet based on site-specific conditions such fuel loadings and topography.

**Cultural Resources**

- In the event that previously unknown sites, cultural artifacts, or features are discovered during project implementation, they would be flagged and operations in the area avoided until the archaeologist can review the site.

- Activities have been coordinated to avoid known cultural resources by buffering up to 90 feet (30 meters) as coordinated between archaeologist and resource/fuels specialists.

**Botany**

- Known sites of pumice grape-fern would be flagged for avoidance prior to equipment work within the following treatment units for all action alternatives: 655, 680, 755, 795, 796, 800, 805, 815, 820 and 870. No equipment or vehicles would be staged within these flagged areas to protect the pumice grape-fern plant.

**Invasive Plant Species**

The Region 6 Invasive Plant Final Environmental Impact Statement (FEIS) Record of Decision (ROD) (USDA Forest Service, 2005) amended the Deschutes LRMP, adding additional standards for invasive plant prevention and control. Prevention would be emphasized as the preferred strategy for invasive plant management by adhering to Regional Standards as adopted by central Oregon Forest Plans. The following identifies which standards apply to this project.

- Actions conducted or authorized by written permit (contracts) that operate outside the limits of the road prism, require clean equipment (i.e., bulldozers, skidders, other logging equipment) prior to entering National Forest System Lands or moving into a new or different analysis area.

- Conduct road blading, brushing, and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists, incorporate invasive plant prevention practices as appropriate (road maintenance and re-opening roads).

- Forest Service employees would inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and personal equipment prior to leaving a project site infested with weeds.

- 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 are judged to be weed free by District or Forest weed specialists. There are no activities, including road reconstruction planned within the analysis area that requires rock from a quarry.

**Recreation**

- To maintain a quality camping and hunting experience, during the green dot road closure period associated with two-week rifle deer season, harvest operations would be suspended in the immediate vicinity of the Boundary Springs campground, including Unit 640.

- During rifle hunting season, all hauling associated with timber harvest would honor agreements with the green dot system and access management restrictions for motorized vehicles.

- In dispersed campsites, to maintain the recreation experience, forest management activities would minimize change to the setting by retaining the largest trees onsite and locating landings, skid trails, and soil activities away from the campsite.

- Protect temporary bollards and trail signs needing to be removed from closed roads to access timber sale activity.

- For rider safety all OHV trails and roads would be closed and posted during timber harvest activities in areas where Three Trails OHV implementation and the Rim-Paunina project overlap.

- To limit disturbance by mechanized equipment to designated OHV trails in harvest units, skid trails, temporary roads, and other crossings would be approved by the Forest Service prior to use.

**Air Quality**

- Reduce particulate emission through utilization to the extent practical (i.e. pulling trees to the landing with limbs attached and biomass utilization versus prescribed burning).

- The objective is to minimize human-caused visual impacts to the Class 1 airsheds. Prescribed burning operations would be restricted during the period of July 1 – September 15th. Also, prescribe burn operations to dissipate smoke away from the Class 1 airshed (i.e. burn during forecasted westerly winds).

- Prescribed burning operations would utilize the following methods to maintain safety and a quality riding experience for those visiting the Walker Mountain area:

    - Sign Boundary Springs campground, motorized trails at appropriate locations and at OHV staging areas.
    - Utilize the physical presence of field rangers at key locations, especially during firing and mop-up.
    - Utilize public notification in media, the Forest Service Web Portal, the COHVOPS website, and other appropriate venues such as organized motorized vehicle clubs.
    - Warning signs would be posted at prominent road junctions to inform the public of prescribed burning operations, and would remain in place until there is no visible smoke. If feasible, roads and trails may be temporarily closed for the protection of public safety.
    - As part of the plan to inform the public, notify local businesses prior to the burning season and on the day of planned prescribed burning operations. Also, notify adjacent landowners of burning operations conducted in units within ¼ mile of their property.
    - Coordinate with appropriate partners, such as the Oregon Department of Fish and Wildlife to incorporate information regarding prescribed burning operations in publications such as the hunting regulations and hunter booth hand outs.
    - Prescribed burning operations are generally discouraged during rifle season and overlapping high visitation weekends such as Memorial Day and Fourth of July.

## Mitigations Common to All Action Alternatives

The following mitigation measures are an integral part of each of the action alternatives. These are different from Project Design Features in that they are typically tied to a specific unit and they are used to avoid, minimize, rectify, reduce, or compensate an impact (40 CFR 1508.20). They are listed here separately to avoid repeating them in each alternative description.

The effectiveness of each measure is rated at high, moderate, or low to provide a qualitative assessment of how effective the practice will be in preventing or reducing resource impacts. These mitigation measures and design elements are considered in the effects discussions of Chapter 3.

Effectiveness ratings of High, Moderate or Low are based on the following criteria: a) Literature and Research, b) Administrative Studies (local or within similar ecosystem), c) Experience (judgment of qualified personnel by education and/or experience, d) Fact (obvious by reasoned, logical, response).

***High**:* Practice is highly effective (greater than 90 percent), meets one or more of the rating criteria, and documentation is available.

***Moderate**:* Documentation shows that practice is 75 to 90 percent effective; or logic indicates that practice is highly effective, but there is no documentation. Implementation and effectiveness of this practice needs to be monitored and the practice will be modified if necessary to achieve the mitigation objective.

***Low**:* Effectiveness is unknown or unverified, and there is little or no documentation; or applied logic is uncertain and practice is estimated to be less than 60 percent effective. This practice is speculative and needs both effectiveness and validation monitoring.

**Vegetation Management**

1. Within all mapped wildlife connectivity corridors site-specific field reconnaissance would be performed by a wildlife biologist, silviculturist, and fuels specialist to determine appropriate treatments and maintain consistency with Regional Forester's Amendment #2 Eastside Screens. For details, reference Connectivity and Fragmentation in the Wildlife section, Chapter 3. *High*

**Table 15. Connectivity Corridor Acres by Alternative**

| Unit | Alt B | Alt C | Alt D | Alt E |
|---|---|---|---|---|
| 25 | 2.2 | 2.2 | 2.2 | 2.2 |
| 45 | 6.0 | 6.0 | 6.0 | 6.0 |
| 50 | 0.2 | 0.2 | 0.2 | 0.2 |
| 60 | 30.0 | 30.0 | 30.0 | 30.0 |
| 70 | 5.0 | 5.0 | 5.0 | 5.0 |
| 115 | 6.1 | 6.1 | 6.1 | 6.1 |
| 120 | 7.9 | 7.9 | 7.9 | 7.9 |
| 125 | 2.2 | 0.0 | 0.0 | 2.2 |
| 130 | 2.3 | 0.0 | 0.0 | 0.0 |
| 135 | 17.8 | 17.8 | 17.8 | 17.8 |
| 140 | 0.5 | 0.5 | 0.5 | 0.5 |
| 145 | 3.4 | 3.4 | 3.4 | 3.4 |
| 180 | 2.8 | 2.8 | 2.8 | 2.8 |
| 185 | 0.1 | 0.1 | 0.1 | 0.1 |
| 195 | 0.8 | 0.8 | 0.8 | 0.8 |
| 205 | 1.1 | 1.1 | 1.1 | 1.1 |
| 240 | 3.6 | 3.6 | 3.6 | 3.6 |
| 255 | 6.9 | 6.9 | 6.9 | 6.9 |
| 290 | 0.5 | 0.5 | 0.5 | 0.5 |
| 300 | 2.6 | 2.6 | 2.6 | 2.6 |
| 305 | 8.1 | 0.0 | 0.0 | 0.0 |
| 335 | 0.4 | 0.0 | 0.0 | 0.0 |
| 385 | 0.5 | 0.5 | 0.5 | 0.5 |
| 390 | 2.0 | 2.0 | 2.0 | 2.0 |
| 395 | 1.1 | 0.0 | 0.0 | 0.0 |

| Unit | Alt B | Alt C | Alt D | Alt E |
|---|---|---|---|---|
| 660 | 9.2 | 9.2 | 9.2 | 9.2 |
| 665 | 25.7 | 25.7 | 25.7 | 25.7 |
| 675 | 0.3 | 0.0 | 0.0 | 0.3 |
| 685 | 1.5 | 1.5 | 1.5 | 1.5 |
| 690 | 2.5 | 2.5 | 2.5 | 2.5 |
| 700 | 1.7 | 1.7 | 1.7 | 1.7 |
| 710 | 1.4 | 1.4 | 1.4 | 1.4 |
| 730 | 2.1 | 2.1 | 2.1 | 2.1 |
| 735 | 2.5 | 2.5 | 2.5 | 2.5 |
| 740 | 0.8 | 0.0 | 0.0 | 0.8 |
| 745 | 1.2 | 0.0 | 0.0 | 1.2 |
| 750 | 7.8 | 7.8 | 7.8 | 7.8 |
| 755 | 3.0 | 3.0 | 3.0 | 3.0 |
| 765 | 5.9 | 5.9 | 5.9 | 5.9 |
| 785 | 9.0 | 9.0 | 9.0 | 9.0 |
| 795 | 2.6 | 2.6 | 2.6 | 2.6 |
| 796 | 4.5 | 4.5 | 4.5 | 4.5 |
| 820 | 4.9 | 4.9 | 4.9 | 4.9 |
| 830 | 8.3 | 8.3 | 8.3 | 8.3 |
| 850 | 2.4 | 2.4 | 2.4 | 2.4 |
| 855 | 2.5 | 2.5 | 2.5 | 2.5 |
| 865 | 2.2 | 2.2 | 2.2 | 2.2 |
| 870 | 1.0 | 1.0 | 1.0 | 1.0 |
| 875 | 8.8 | 8.8 | 8.8 | 8.8 |
| 876 | 4.4 | 4.4 | 4.4 | 4.4 |

| Unit | Alt B | Alt C | Alt D | Alt E |
|---|---|---|---|---|
| 405 | 4.3 | 4.3 | 4.3 | 4.3 |
| 430 | 6.2 | 6.2 | 6.2 | 6.2 |
| 435 | 3.4 | 0.0 | 0.0 | 0.0 |
| 605 | 1.4 | 1.4 | 1.4 | 1.4 |
| 610 | 2.2 | 2.2 | 2.2 | 2.2 |
| 645 | 25.6 | 25.6 | 25.6 | 25.6 |

| Unit | Alt B | Alt C | Alt D | Alt E |
|---|---|---|---|---|
| 880 | 4.0 | 4.0 | 4.0 | 4.0 |
| 885 | 2.5 | 2.5 | 2.5 | 2.5 |
| 940 | 13.5 | 13.5 | 13.5 | 13.5 |
| 945 | 6.4 | 6.4 | 6.4 | 6.4 |
| 965 | 0.2 | 0.2 | 0.2 | 0.2 |
| **TOTAL** | **300** | **280.2** | **280.2** | **284.7** |

**Soil and Water Quality**

1. To achieve acceptable productivity potential following land management activities (Forest Plan page 4-70, SL-1 and SL-3), Guidelines (FSM 2500, R-6 supplement 2500-98-1), Forest Service Region 6 Supplement 2520.3 – Policy, use subsoiling to relieve compacted soils, if monitoring shows detrimental conditions. Currently there are no units estimated to require subsoiling after management activities. *High*

**Wildlife**

1. To minimize disturbance to deer and elk during fawning/calving season. A limited operating period would be applied to activities near water sources during the period of May 1 through June 30. This measure would reduce the disturbance to mule deer does and elk calves during the fawning/calving season and lessen the potential of fawn/calf abandonment and/or mortality during the critical time period. The ability to implement and the efficacy of this measure is considered *High* forest-wide. The seasonal restrictions on prescribed burning, timber sale activities and pre-commercial thinning would be applied to the following treatment units:

   **Alternative B**: 5, 6, 25, 195, 205, 225, 275, 385, 621, 665, 785, 825, and 1065
   **Alternatives C and D**: 5, 6, 25, 195, 205, 225, 275, 385, 615, 621, 625, 665, 785, 825, 1065, 3005, 3055, 3060, 3065, 3095, 4000, 4005, and 4095.
   **Alternative E**: 5, 6, 25, 195, 205, 225, 275, 385, 615, 621, 625, 665, 785, 825, 1065, 3005, 3055, 3060, 3065, 3095, 4000, 4005, and 4095.

2. If requested, waivers may be considered if surveys are conducted and determine deer and/or elk are not present in individual units during the calving/fawning season. *High*

3. Within units #275, #665, #785, #825, #1065, and #4095, maintain a minimum six acre unthinned clump centered on the following guzzlers: South Paunina #2, Crescent Siding, #248, Marmot Butte, South End, and South Paunina #3. Commercial timber harvest, pre-commercial thinning, and prescribed underburning would not be permitted within the six acre no treatment clump. Approximately four acres of unit #390 surrounding the Paunina #4 guzzler would be underplanted with sugar pine and/or lodgepole pine trees to develop future big game hiding cover. No underburning in unit #390 would be permitted to retain the hiding cover currently present. This measure is intended to provide and maintain big game hiding cover near developed water sources. This mitigation applies to all Action Alternatives; B, C, D, and E. *High*

4. The following units would have retention areas that exceed the fifteen percent previously mentioned in the Project Design Features description. There are several reasons for the increased level of no treatment retention areas. Several subwatersheds have low levels of hiding cover and additional retention allows increased size of cover blocks and better distribution across the project area. Wherever possible, retention blocks would meet the definition of hiding

cover and be placed adjacent to roads and trails open for motorized use. The presence of wildlife connectivity corridors, cultural heritage sites, large rock outcrops, developed water sources, sensitive plant sites, or other resource concerns are also reasons for increased amounts of no treatment areas. *High*

A**lternative B:** 15% all units

**Alternatives C and D:** units with 20% retention: 265, 410, 430, and 510

**Alternatives C and D:** units with 25% retention: 5, 25, 40, 45, 70, 80, 90, 120, 140, 195, 775, 3005, 3010, and 3020

**Alternative E**: units with 20% retention: 265, 410, 430, and 510

**Alternative E**: Units with 25% retention: 5, 25, 40, 45, 70, 80, 90, 120, 140, 195, 290, 390, 615, 775, 3005, 3010, and 3020

**Recreation**

1. Harvest operations and haul routes would be restricted in the following units to protect access and quality of winter snowmobile trails and to maintain safety of users. Seasonal restrictions for harvest operations accessed by Forest Service roads 5835 and 5840 would be in place between December 1 and March 31, unless agreed otherwise depending upon snow conditions. *High*
    a. **Alternatives B and E:** 195, 205, 215, 220, 240, 255, 265, 270, 275, 285, 286, 290, 295, 300, 310, 345, 350, 465, 470, 480, 490, 495
    b. **Alternatives C and D: 195,** 205, 240, 255, 265, 275, 285, 286, 290, 295, 300, 345, 350, 355, 465, 470, 490, 495, 510

2. The following Rim-Paunina units would require coordination between the fuels specialist, presale specialist, timber sale administrator, and the Central Oregon Combined Off-Highway Vehicle Operations (COHVOPS) trail specialist to ensure adequate buffer and/or 'pivot' trees, as needed to maintain OHV trail integrity for the Rivers South trail area of Three Trails OHV Project implementation that overlaps the Rim-Paunina Project area. *Moderate*
    a. **Alternative B** Harvest units: 180, 235, 250, 260, 385, 390, 400, 410, 415, 430, and 445
    b. **Alternatives C and D** Harvest units: 180, 235, 250, 260, 385, 390, 400, 410, 430, and 445; and 'fuels only' units: 3095, 4065, 4070, 4075, 5005, and 5010.
    c. **Alternative E** Harvest units: 180, 235, 250, 260, 385, 390, 400, 410, 415, 430, and 445; and 'fuels only' units: 3095, 4065, 4070, 4075, 5005, and 5010.

3. The following Rim-Paunina Units would require coordination between the fuels specialist, presale specialist, timber sale administrator, and the Central Oregon Combined Off-Highway Vehicle Operations (COHVOPS) trail specialist to ensure adequate buffer and/or 'pivot' trees, as needed to maintain OHV trail integrity for the Three Trails OHV 10-mile loop trail: *Moderate*
    a. **Alternative B** Harvest units: 255, 265, 275, 310, 345, 355,
    b. **Alternatives C and D** Harvest units: 255, 265, 275, 345, 355, and 'fuels only' units: 3075, 3080, 4080, 4085, and 4095.
    c. **Alternative E** Harvest units: 255, 265, 275, 310, 345, 355, and 'fuels only' units: 3075, 3080, 4080, 4085, and 4095.

4. The following Rim-Paunina Units would require coordination between the fuels specialist, presale specialist, timber sale administrator, and the Central Oregon Combined Off-Highway Vehicle Operations (COHVOPS) trail specialist to ensure adequate buffer and/or 'pivot' trees, as needed to maintain OHV trail integrity for the Three Trails OHV Walker Mountain area trails: *Moderate*
    a. **Alternative B** Harvest units: 870, 940, 1025, 1030, 1060, 1065, 1070, 1085, 1090, and 1096

b. **Alternatives C, D, and E** Harvest units: 870, 940, 1025, 1030, 1060, 1065, 1070, 1085, 1090, and 1096, and 'fuels only' units: 4050, 4060, 5015, 5020, 5025, and 5030.

**Scenery along Highways 58 and 97**

1. Timing of cleanup along Highways 58 and 97 would occur two years following activity in units: Forest Plan Standard and Guideline M9-8 and M9-58. *High*
   a. **Alternative B:** 70, 115, 145, 430, 865, and 870
   b. **Alternatives C, D, and E:** 70, 115, 145, 430, 865, 870 and 3015

2. Design skid trails and landings to minimize visibility. Landings closer than 200 feet would be approved on a case by case basis. During on-the-ground layout of skid trails take advantage of vegetation screening and topography and where possible run skid trails perpendicular to the highway to minimize visibility. Forest Plan Standard and Guideline M9-4 and M9-57. *High*

3. Following implementation of all harvest and post sale operations, the objective is to have no visible marking paint to visitors on the roadway. After activities are completed, remove tags, ribbons, boundary signs and other means of designating activity. Forest Plan Standard and Guideline M9-4 and M9-57. *High*

## Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of the alternatives may have duplicated the alternatives considered in detail or were determined to be unable to meet the project's Purpose and Need. Alternatives that were considered but dismissed from consideration and the reasons for dismissal are summarized below.

**Utilize Group Selection for Areas Where There is a High Occurrence of Dwarf Mistletoe but Retain Trees 21 inches in Diameter and Greater**

Some ponderosa pine stands in the Rim-Paunina area are so severely infected with dwarf mistletoe, long term mortality of the overstory trees and their replacement creates a gap-in-time that can span decades before larger trees are available. In responding to Key Issue #2, Alternative D would create two to five acre openings totaling 15-30 percent of the total stand area and removing all sources of dwarf mistletoe to stop the cycle of infection. This would include trees that are severely infected 21 inches and larger. Some members of the public suggested exploring areas in severely infected stands where a sufficient gap could be created while retaining all large trees.

The Interdisciplinary Team silviculturist performed additional monitoring of stands to determine if this suggestion was feasible. Although considered, it was later determined that this alternative method would not sufficiently respond to creating sufficient gaps from severely-infected sources and was therefore not analyzed in further detail. Additional walk-through surveys revealed the juxtaposition of trees 21 inches and over were too close to provide sufficient gaps. Subsequent dispersal from infected sources would likely infest the desired openings at a rate faster than the established regeneration could outgrow the infection.

**Thin Trees to 12-, 15- or 16-inch Maximum Diameter with No Created Openings**
Some members of the public feel that thinning should be limited to various diameters less than 21 inches and have no created openings. These alternative maximum diameters were considered but eliminated from detailed study because they do not achieve the density reduction objectives in most stands and they remain in the Upper Management Zone; thereby increasing the rate of mortality to a level that is expected to increase faster than large diameter trees can develop. This diminishes an important habitat component for the white-headed woodpecker.

**Use Prescribed Fire to Achieve Density Reduction Objectives**
This alternative was considered but eliminated from detailed study because reintroduction of fire is not a viable option in most stands without creating conditions where low-intensity/frequent fire can be established. Most stands within the Rim-Paunina Project area identified for active management are too dense and application of fire would cause an undesired level of mortality to the overstory trees, even potentially causing stand-replacing fires which would result in the loss of large-diameter trees. Retention of overstory trees is desirable and part of the Purpose and Need of the project. However, there would be approximately 3,800 acres of "maintenance" prescribed burning outside of commercial harvest units in Alternatives C-E, which use prescribed fire to meet stand objectives.

**Include Walker Rim and Little Walker Mountain for Similar Density Reduction Objectives as in Alternatives B-E**
An alternative was considered but eliminated from detailed study to commercially thin along the steeper portions of the project area; particularly 3,000 acres where dwarf mistletoe surveys have indicated pockets of severe infections on Walker Rim. This was considered but eliminated from detailed consideration due to a combination of resource concerns associated with the two areas. They include soil quality, the high cost of utilizing an advanced logging system (such as skyline or helicopter logging where operating costs exceeds the value of timber being removed), cultural resources, big game movement, and the scenery as viewed from major travelways.

**Regenerate Severely-Infected Stands by Clearcutting Larger Than 2-5 Acre Openings**
This alternative was considered as it has been demonstrated to be effective in controlling dwarf mistletoe and can be cost-effective. This alternative was eliminated from detailed consideration because of the number of large trees that would be removed at one time would diminish important habitat for the white-headed woodpecker and dependent species quicker than desired. Therefore, this alternative was eliminated from detailed consideration.

**Planting Mistletoe-Resistant Tree Species in the Understory**
This alternative was explored in order to allow a relatively disease-free understory to develop and replace the larger trees. It would also retain an important habitat component in the larger infected trees on the landscape through mortality. This alternative was eliminated from detailed analysis because there are not suitable areas in sufficient quantities where the environmental factors for survival and growth of desired tree species could be manipulated to provide a successful shift in composition. These factors include frost, heat, and shade. Wherever there is potential for an alternative desired tree species to be successfully regenerated within severely infected stands, it was included in Alternatives D and E list of activities.

## Sale Area Improvement Projects

Money may be collected from the timber sales to complete certain projects as required reforestation, identified mitigation, and enhancement and restoration projects in the vicinity of the timber sale areas. Required reforestation items (R) and mitigation measures (M) have the highest priority for funding, but may be funded by other means such as appropriated funds to insure that requirements are accomplished. Items marked with an (E) are considered Enhancement.

This list is intended to serve as an overall guide in the analysis area. As timber sales are delineated within the project area, specific priorities may be adjusted to meet the needs for each sale area. This priority setting should be documented briefly in the implementation file for each timber sale.

1. Planting (R)
2. Unmanageable Tree Cutting (R)
3. Mechanical Brush Release (R)
4. Subsoiling (M)
5. Small Diameter Thinning (E)
6. Prescribed Burning (E)
7. Grapple Pile and Disposal of Hazardous Fuels (E)
8. Treatment of Existing Invasive Plants (hand-pulling) (E)
9. Pruning (E)
10. Snag Creation (E)
11. Aspen Fencing for Browse Protection (E)
12. Invasive Plant Monitoring (E)
13. Closed Road Sign Posting (E)
14. Guzzler Replacement (E)

## Comparison of Alternatives

The following tables provide additional information for a comparison between alternatives.

**Table 16. Comparison of how the Alternatives meet the Purpose and Need**

| | Alt A | Alt B | Alt C | Alt D | Alt E |
|---|---|---|---|---|---|
| **Purpose and Need - *To decrease the density of trees (in acres)*** | | | | | |
| Density reduction in Ponderosa Pine | 0 | 6,082 | 5,717 | 4,307 | 5,244 |
| Improvement cuts primarily in Lodgepole Pine (which includes density reduction) | 0 | 5,910 | 4,032 | 2,849 | 4,028 |
| Small Diameter Thin on Walker Rim | 0 | 0 | 1,205 | 1,205 | 1,205 |
| Stand prescriptions specifically designed for severely infected mistletoe stands (HSG and AltMist) | 0 | 0 | 0 | 2,593 | 1,921 |
| Aspen Treatment | 0 | 43 | 43 | 43 | 43 |
| **Total** | | 12,036 | 10,997 | 10,997 | 12,441 |
| **Purpose and Need - *Increase White-headed Woodpecker habitat in addition to thinning(in acres)*** | | | | | |
| Restore Ponderosa Pine to a low-intensity, frequent fire regime | 0 | 8,506 | 12,762 | 12,762 | 13,490 |
| **Purpose and Need - *Contribute to the local and regional economies by providing timber and other wood fiber products*** | | | | | |
| Local and regional economics | No Commercial timber harvest | 19.9 MMBF with approximately 70% saw logs | 15.5 MMBF with approximately 70% saw logs | 25.3 MMBF with approximately 70% saw logs | 24.1 MMBF with approximately 70% saw logs |

**Table 17. Comparison of how the Alternatives Address the Key Issues**

| Key Issue | Alt A | | Alt B | | Alt C | | Alt D | | Alt E | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Key Issue #1 –Moving ponderosa pine stands to a more open condition results in less desirable habitat conditions for species such as accipiter hawks and big game, and thus some retention is needed** | | | | | | | | | | |
| ***Dense ponderosa pine stands retained as compared to the proposed action (in acres)*** | No treatment | | 0 | | 365 | | 365 | | 87 | |
| ***Big Game hiding cover remaining post-treatment for all habitat types (in acres)*** | 24,259 | | 18,021 | | 16,940 | | 16,940 | | 16,020 | |
| ***Nesting habitat (in acres for a given year)*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** |
| White-headed Woodpecker | 786 | 424 | 1,643 | 1,803 | 1,565 | 1,697 | 1,487 | 1,602 | 1,700 | 1,745 |
| Goshawk | 8,989 | 28,355 | 7,325 | 24,167 | 7,439 | 25,157 | 7,279 | 25,371 | 5,931 | 24,300 |
| Cooper's Hawk | 6,891 | 20,260 | 5,844 | 16,455 | 5,915 | 17,411 | 5,816 | 17,854 | 5,519 | 16,336 |
| Sharp-shinned Hawk | 2,268 | 10,239 | 1,893 | 8,124 | 1,929 | 8,738 | 1,895 | 9,214 | 1,813 | 8,834 |
| **Key Issue #2 – A considerable portion of the ponderosa pine-dominated stands are heavily infected with dwarf mistletoe in all size classes, affecting the long-term creation of white-headed woodpecker habitat** | | | | | | | | | | |
| ***Mistletoe-Infected Ponderosa Pine stands treated (in acres)*** | No treatment | | 6,082 | | 5,717 | | 6,900[13] | | 7,165[14] | |
| **Key Issue #3 – In the short-term, decadent lodgepole stands serve as important habitat for black-backed woodpecker, and thus some retention is needed** | | | | | | | | | | |
| ***Decadent lodgepole stands retained as compared to the proposed action (in acres)*** | No treatment | | 0 | | 1,878 | | 1,878 | | 712 | |
| ***Denning/Nesting habitat (in acres for a given year)*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** | ***2018*** | ***2058*** |
| American Marten | 4,814 | 12,661 | 3,475 | 11,284 | 4,018 | 11,512 | 4,016 | 11,506 | 3,406 | 11,375 |
| Black-backed Woodpecker | 23,806 | 25,442 | 21,178 | 24,344 | 21,959 | 24,538 | 21,919 | 24,538 | 20,648 | 24,299 |
| **Key Issue #4 – Treatment is needed to return conditions to an appropriate fire interval** | | | | | | | | | | |
| ***Prescribed Fire Applied (in acres)*** | No treatment | | 8,506 | | 12,762 | | 12,762 | | 13,490 | |

[13] HTH – 4,307 acres, HSG - 2,593 acres, of which approx 30 % (778 acres) would consist of 2-5 acre openings, the remaining 70% would be HTH

[14] HTH – 5,244 acres, AltMist - 1,921 acres of severely infected dwarf mistletoe thinned and then hasten mortality to trees 21+ inches by prescribed fire or other means

**Table 18. Comparison of All Alternatives**

| Proposed Activities | Approximate Acres | | | | |
|---|---|---|---|---|---|
| | ALT A | ALT B | ALT C | ALT D | ALT E |
| Density reduction, or thinning, including commercial and non-commercial removal in ponderosa pine (HTH). | 0 | 6,082 | 5,717 | 6,122 | 5,244 |
| Improvement cutting primarily in lodgepole pine to enhance overall stand composition and quality (HIM). | 0 | 5,910 | 4,032 | 2,849 | 4,028 |
| Group selection (HSG) in the most severely infected stands includes openings 2-5 acres. Includes removing trees over 21 inches in diameter. | 0 | 0 | 0 | 778[15] | 0 |
| Removal of all trees under 21 inches in the most severely infected stands plus activity-induced mortality to larger diameter trees which are a source of infection (AltMist). | 0 | 0 | 0 | 0 | 1,921 |
| Aspen Treatment | 0 | 43 | 43 | 43 | 43 |
| Disposal of activity-created slash without underburning. | 0 | 3,530 | 2,015 | 2,015 | 2,730 |
| Disposal of activity-created slash followed by prescribed underburning. | 0 | 8,506 | 7,777 | 7,777 | 8,506 |
| Brush mastication and apply prescribed “maintenance” prescribed burning outside of commercial harvest units. | 0 | 0 | 3,780 | 3,780 | 3,780 |
| Thin small diameter material, pruning of limbs, pile, dispose of piles, and then apply prescribed underburning. | 0 | 0 | 1,205 | 1,205 | 1,205 |

[15] This number is approximately 30 percent of total HSG acres (2,593 acres) in the Rim-Paunina project area, the remaining 1,815 acres would be commercially thinned similar to being treated as HTH.

# Chapter 3. Affected Environment and Environmental Consequences

## Cumulative Effects of Past, Present and Reasonably Foreseeable Future Actions

This chapter summarizes the physical, biological, social, and economic environments of the analysis area and the anticipated effects of implementing each alternative on that environment.

"Affected Environment" refers to the existing biological, physical, and social conditions of an area that are subject to change directly, indirectly, or cumulatively as a result of a proposed human action. Information on the affected environment is found in each resource section under "Existing Condition."

The following discussion of effects follows CEQ guidance for scope (40 CFR 1508.25(c)) by categorizing them as direct, indirect, and cumulative. The focus is on cause and consequences. Effects exist in a chain of consequences and thus may be labeled "indirect" (occurring later in time or farther in distance, 40 CFR 1508.8(b)), rather than cumulative. For this analysis, in general, direct and indirect effects have been discussed in the context that most readers are accustomed to: those consequences which are caused by the action and either occur at the same time and place, or are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR 1508.8). Cumulative effects are discussed where there is an effect to the environment which results from the incremental effect of the action when added to other past, present, or reasonably foreseeable future actions (40 CFR 1508.7).

There are basically two methodologies the individual resource subjects use in discussing cumulative actions and consequences. The first method would be to describe each individual past, present, and reasonably foreseeable action – including mitigation (cataloging). The second would be to "lump" individual actions if the information regarding those actions would not be useful to illuminate or predict the effects of the proposed action and its alternatives. A mere "cataloging" of effects may not provide the most useful discussion. In some cases, lumping past actions and describing them in terms of "where we are today" can be the most informative. No matter which method is used, it would be formulated to provide the most relevant, useful, helpful, necessary and informative format for the public and deciding official.

Where there is an overlapping zone of influence, or an additive effect, this information is disclosed. In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

The temporal and spatial scale of the analysis is variable depending upon the resource concern being evaluated, particularly for cumulative effects. The landscape within the Rim-Paunina analysis area boundary is the focus of this EIS, but adjacent lands are considered in this analysis process.

Measures to mitigate or reduce adverse effects caused by the implementation of any of the actions proposed are addressed in Chapter 2, Resource Protection Measures. Effective mitigation avoids, minimizes, rectifies, reduces, or compensates for potential effects of actions. After mitigation is applied, any unavoidable adverse effect to each resource area is addressed in the section titled "Other Disclosures" in this chapter of the EIS.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one can not reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks while ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The cumulative effects analysis in this EIS is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives would add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)"

**Table 19**. **Past, Present, and Reasonable Foreseeable Future Actions**

| Project/Event Name | General Description of Activities | Status |
|---|---|---|
| Gilchrist State Forest (2010) | State of Oregon purchased 43,235 acres of working forest lands east of Hwy 97 near the town of Gilchrist, OR from Cascade Timberlands. In addition, the Conservation Fund has purchased 25,000 acres of adjacent forest for later acquisition by the state. This block borders the Rim-Paunina area to the north. | State of Oregon is developing a comprehensive management plan. |
| Baja EA (1998-2003) | 2,878 acre understory thin (1,068 within suitable northern spotted owl habitat); 166 acres salvage in lodgepole pine; 904 acres prescribed burning in appropriate stands; and 250 acres of early seral stands in lodgepole pine. | Completed and included in the existing condition where it overlaps the Rim-Paunina Project area. |
| BLT (2008) | Commercial and small-tree thinning of forested stands, prescribed burning, piling and disposal of activity-generated slash, and construction of 9.8 miles of temporary roads over 7,499 acres within the analyzed vegetation management 80,000-acre BLT project area. | Implementation and included in the existing condition where it overlaps the Rim-Paunina Project area. |
| Boundary Springs CE (2004) | 230 acres of hazardous fuels reduction in the Little Walker Mountain Watershed along private land. Includes small diameter thinning, utilization, and disposal. | Completed and effects from the action have diminished. |
| Danger Tree Removal (annual) | Removal of identified hazard trees along roads and in recreation areas and parking lots. Dependent upon the magnitude of disturbance events, an average year would fell 100 hazard trees or less district-wide per year. | Ongoing and mainly associated with the Three Trails OHV staging areas. |
| Region 6 Invasive Plant EIS (2005) | Implements Standards and Guidelines and prevention strategies to manage invasive plant species. | Implementation |
| Three Trails OHV Project (2010) | 142 miles of designated motorized OHV trails over a 93,016 acre project with the focus on areas that are currently being most heavily used by riders. Fifty-six to 94 miles of user-created trails would be rehabilitated. | Implementation. Approximately ½ of the trail system overlaps the Rim-Paunina Project area in the Rivers and Walker segments. |
| Small Tree Thinning (2011 and annually) | District-wide thinning of small trees, primarily in plantations. Some thinning units overlap with the Rim-Paunina project area. In 2011, the thinning program was approximately 500 acres. | Implementation |
| Deschutes and Ochoco National Forests and Crooked River National Grassland Travel Management Project EIS (2011) | Motorized travel in central Oregon would be restricted to designated roads and trails only. Access to dispersed camping would have special provisions to limit access to sensitive areas. | Implementation |

## Project Record

The interdisciplinary team (IDT) includes Forest specialists for each discipline (see Chapter 4 for team members and their qualifications). Specialists on the IDT prepared technical reports to address the affected environment and environmental consequences of the Rim-Paunina project. All reports are maintained in the project file, located at the Crescent Ranger District office in Crescent, Oregon. In some cases, this chapter provides a summary of the report and may only reference technical data upon which conclusions were based. Specialist reports as well as any field surveys referenced in Chapter 3 are incorporated by reference into this EIS (40 CFR 1502.21).

# Wildlife

**Introduction to Wildlife Effects**
The following specialist reports for wildlife sections, Threatened, Endangered and Sensitive Species (TES), Management Indicator Species (MIS), Birds of Conservation Concern (BCC), and Big Game have been incorporated in their entirety. The Zone of Influence for discussion on effects is bounded by the project area for all species except Big Game which is bounded on a subwatershed basis. The area of influence includes overlap with existing conditions such as roads, trails, and past management activities.

This section includes discussion on data used, methods, models, general assumptions, evaluation criteria and a summary of effects. General effects are discussed in this section. General effects cover broad categories of species and those effects that are common to all alternatives including the no action alternative.

**Species Analysis**
Sensitive species were analyzed using the 2008 R6 Regional Forester's Sensitive Species list[16]. Management Indicator Species (MIS) were analyzed for those species identified in the Deschutes National Forest Land and Resource Management Plan (LRMP). Surveys were not conducted specifically for this project. Recent surveys from overlapping projects (Three Trails OHV), in addition to historical data, were used in determination of species occupancy within the Rim-Paunina project area. Incidental species observations have also contributed to the knowledge of species presence within the project area and/or Crescent Ranger District. Potentially suitable habitat is considered to be occupied unless surveys or incidental observations have not detected the species.

The information used for habitat definitions and trend analysis of species is from the best available research found in books, scientific journals, and scientific websites. Nesting/denning habitat is assumed to be the limiting factor for most species. Nesting/denning habitat was modeled for key species, providing a more meaningful analysis than modeling all habitats used. Effects to other habitats used (foraging, resting, etc.) were addressed in the analysis, and were not modeled.

One major contributor for population trend data is NatureServe, an international non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action. NatureServe and its network of natural heritage programs, including Oregon State Heritage Program, are the leading source for information about rare and endangered species and threatened ecosystems. Their website, http://www.natureserve.org/, compiles historic and current information from The Nature Conservancy and other conservation groups, U.S. government agencies, private sector partnerships, international agencies, and data cooperators.

**Survey and Manage**
Survey and manage species are managed by the Deschutes National Forest Land and Resource Management Plan (LRMP) as amended by the Northwest Forest Plan. Management of these species occurs within the range of the northern spotted owl under the Northwest Forest Plan. The Rim-Paunina project area is outside the range of the northern spotted owl therefore these species were not analyzed for this project unless they were under another category (i.e. TES, MIS, BCC etc.).

[16] The Regional Forest's Sensitive Species list was updated in a letter signed December 9, 2011. The updated list applies to all projects initiated on or after the date of this letter. Projects initiated prior to the date of this letter may use the list that was in effect when the project was initiated. More info updated list at: http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/. The Rim-Paunina project was initiated March 01, 2009

**Modeling Methodology**
Habitat for the various wildlife species was determined using district occurrence data, habitat descriptions found in scientific literature, various data sets, and professional experience. The Viable Ecosystem Model (Viable) was used to determine the live tree component of habitat and formed the basis of acres of existing nesting/denning habitat (Viable Ecosystems Management Guide 1994). For selected species, such as the black-backed woodpecker and American marten, the snag components of habitat were determined using a variety of sources including gradient nearest neighbor (GNN) data and DecAID, as well as Viable. Because of Forest Plan standards for cover and thermal cover requiring trees per acre and height, deer and elk habitat was determined using GNN data.

This section describes each model and/or data set and how they were used separately or in combination with others. While modeling habitats or components generally match conditions known to occur on the ground, modeling does not necessarily match a specific point. It gives conditions that may occur given the assumptions of the model. Since it was used identically, for all alternatives, it provides a basis for comparison. Also see the Forested Vegetation section in this Chapter for more modeling information.

**Viable Ecosystems Model**
The Ochoco and Deschutes Viable Ecosystems Management Guide (VEMG) was developed to classify vegetation on a landscape basis. "The Viable Ecosystem model provides a process to apply ecosystem management concepts to project level planning. This system compares existing vegetation with site potential. The model focuses on relationships between combinations of vegetation structure and species composition, and habitat requirements for animals, insects, and plants. Viable Ecosystems is a useful tool for cumulative effects analysis of broad scale changes in vegetation at a subwatershed to Forest-wide scale and subsequent changes in animal, insect, or plant communities."

Viable stratifies the environment along a gradient of size, structure, species composition, and relative tree density. The various classifications are then linked to wildlife habitat requirements. For example, a classification with a value of 5615**2** is white fir (56), early seral (1), medium/large structure (5), and **low density (2)** and would typically have a single story (low density) dominated by ponderosa pine (early seral in white fir) 21" diameter or greater (medium/large structure). This provides nesting habitat for white-headed woodpeckers. A value of 5635**1** would equate to white fir (56), late seral (3), medium/large structure (5), and **high density (1)** and would be a multi-storied stand dominated by white fir 21" diameter or greater and provide nesting habitat for pileated woodpeckers. All values that provide habitat for species were used. In addition to the mixed conifer value of 56152 using the white-headed woodpecker example, any seral stage dominated by ponderosa pine, medium/large structure, and low density would provide similar open ponderosa pine habitat and was used in determining amounts of white-headed woodpecker nesting habitat across the Deschutes National Forest.

The 2002 satellite imagery layer was used to develop the vegetation layer to run in the Viable Ecosystem Model. Data is mapped on a 30 meter pixel grid, meaning the map is divided up on a 30 meter grid and that every 30 meter square (pixel) is assigned a value (i.e. 56351) that relates to a stratum of size, structure, tree species composition, and relative tree density. Criteria used (vegetation, seral state, structure, and density) to determine habitat for each species is described in the existing condition of each species. No major vegetation projects have taken place in the project area since 2002. Existing conditions include past actions such as timber sales which used the Forest "FACTS" database. Presenting information in this way and including those current and foreseeable future actions in cumulative effects is the most informative for the decision maker.

**GIS Analysis and ArcMap**

A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. The information can be related to visual data (maps), tabular data (tables, spreadsheets, or data bases), and used to run models (create new data set from existing data based on criteria or specific conditions). ArcMap is a component of the ArcGIS program. The client software developed by Economic and Social Research Institute (ESRI) was used for the processing and presentation of GIS data.

***Gradient Nearest Neighbor (GNN)***

GNN maps consist of 30 meter pixel (grid) maps with associated data (tree size, density, snag density, canopy cover, percent down wood cover, etc.). The maps used for this analysis were developed by the Landscape Ecology, Modeling, Mapping, and Analysis (LEMMA) team as part of the GNNPAC Pacific States Forest Vegetation Mapping project. This project involves developing detailed maps of existing forest vegetation across all land ownerships in the Pacific Coast States (Oregon, Washington, and parts of California). It is being conducted by the LEMMA team (Pacific Northwest Research Station (PNW) and Oregon State University) at the Corvallis Lab, in close collaboration with the Western Wildlands Environmental Threats Assessment Center, the Interagency Mapping and Assessment Project (IMAP), Northwest Forest Plan Effectiveness Monitoring, the Remote Sensing Applications Center, and Forest Inventory and Analysis at the PNW Research Station.

The process to create the maps involves using gradient imputation (Gradient Nearest Neighbor, or GNN). GNN uses many variables on a gradient along with satellite imagery to assign data from known field plots to pixels with no data that have the same satellite imagery signature (i.e. it "looks" the same to the computer). The species-size GNN model was used in the Rim-Paunina analysis. This model uses species composition and stand structure as components for developing maps. Accuracy of the modeling depends on how "like" pixels match up based on numerous variables. Generally speaking, forest types that had more samples like white-fir were more accurate than those with fewer samples like mountain mahogany (Ohman et al. 2008). Information on GNN accuracy, the LEMMA group, IMAP and the GNNPac project is available at the project website: http://www.fsl.orst.edu/lemma/gnnpac.

***DecAID***

DecAID is a web-based dataset, it is not a model. It is a synthesis of all of the best available research on dead wood. DecAID does not provide information on all life needs of a given species. It integrates current research/studies on wildlife use of dead wood (snags, down wood, dead portions of live trees) in various habitat types. From this, tolerance levels are generated.

***Tolerance level*** (t.l.) is the percent of the studied population that would use a density of snags or down wood. For example, the following table shows the tolerance levels for white-headed woodpeckers. For a population of 100 individual white-headed woodpeckers, at the 50 percent tolerance level, 50 of them would use habitat with at least 1.7 snags per acre greater than or equal to10 inches in diameter. Basically, the higher the tolerance level, the more assurance that you are providing habitat to meet the needs of more individuals in the population (Mellen et al. 2006).

***Tolerance intervals*** (t.i.) were used to determine habitat levels in the planning area. A tolerance interval includes the range of snag density between tolerance levels. Using the example below, the 30-50 percent tolerance interval would be habitat with more than 0.3 snags per acre and less than or equal to 1.7 snags per acre. The 0-30 percent category is included (where 0 values are actually greater than 0) as it provides habitat for a few individuals. A zero category is included in the analysis showing what acreage does not provide habitat.

**Table 20. Example of Tolerance Levels and Intervals developed from DecAID Information**

| Habitat type and Table used from DecAID: Table PPDF_S/L.sp-22; Species: White-headed Woodpecker | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Minimum DBH** | **10"** | | | | | **20"** | | | |
| Tolerance Level | | 30% | 50% | 80% | | | 30% | 50% | 80% |
| **Snag Density (#/acre)** | | 0.3 | 1.7 | 3.7 | | | 0.5 | 1.8 | 3.8 |
| Tolerance Interval | 0-30% | 30-50% | 50 -80% | 80%+ | | 0-30% | 30-50% | 50 -80% | 80% + |
| **Snag Density (#/acre)** | 0-0.3 | 0.3 - 1.7 | 1.7-3.7 | 3.7+ | | 0-0.5 | 0.5-1.8 | 1.8-3.8 | 3.8+ |

Often times, DecAID only had one study available to base its tolerance levels on. While applying findings from a single research site to another area is not always wholly applicable, DecAID provides the best available science to determine effects to a species at this time. Used as a comparison for effects across all alternatives, it can be a useful tool. Tolerance levels do not equate to population potential, nor imply viability, but they are assumed to indicate habitat at varying snag densities.

More information on DecAID can be found on the website at:
www.fs.fed.us/wildecology/decaid/decaid_background/decaid_home.htm

**Deer and Elk Habitat**

The Deschutes Forest Plan defines suitable deer hiding cover as one of the following:

a) six acres or larger capable of hiding 90 percent of a standing adult deer from view of a human at a distance of 200 feet, or
b) six acres or larger with an average height of six feet and which has not been thinned in 15 years, or
c) residual clumps of one half acre or larger stands within units with advanced regeneration (trees including small trees up to seven inches in diameter) and at least 12 greater than seven inch trees per acre remaining after harvest (LRMP, WL-54, p. 4-58). Residual clumps less than six acres in size were not modeled which likely under-represents the amount of hiding cover present in the subwatershed analysis.

Suitable elk hiding cover is similar**:**

a) being six acres or larger capable of hiding 90 percent of a standing adult elk from view of a human at a distance of 200 feet, or
b) six acres or larger with an average height of 10 feet and which has not been thinned in 20 years, or residual clumps of two acres, or
c) larger stands within units with advanced regeneration (trees including whips up to seven inches in diameter) and at least 12 greater than seven inch trees per acre remaining after harvest (LRMP, WL-47, p.4-57).

To be conservative, hiding cover for both species was modeled using Gradient Nearest Neighbor (GNN) with the criteria of hiding 90 percent of a standing adult elk from view of a human at a distance of 200 feet. This condition was modeled using trees with a density of at least 469 trees/hectare (190 trees/acre or a tree every 15 ft) with a diameter of 3-25 cm (1-10 in) and at least two meters (7 ft) tall across the 40,000 acre planning area. Fields containing this data in GNN and the definitions from the data dictionary include:

- TPH_3_25 – Density of live trees 2.5-25 cm dbh in trees/hectare.

- STNDHGT – Stand height, computed as average of heights of all dominant and codominant trees in meters.

LEMMA Data Dictionary: http://www.fsl.orst.edu/lemma/common/dataDictionary.php

Thermal cover for deer is not analyzed. Standards for deer thermal cover apply to winter range only. There is no winter range in the project area.

Thermal cover for elk is not analyzed. Standards for elk thermal cover apply to Key Elk Areas. There are no Key Elk Areas in the project area.

An important finding from the Starkey Experimental Forest and Range studies is that road (or route) density is not the best predictor of habitat effectiveness for elk. Instead, a model based on distance bands proved to be a more spatially explicit and biologically meaningful tool for assessing effects from roads. Road densities do not provide a spatial depiction of how roads are distributed on the landscape (Rowland 2005). Consequently, a distance banding analysis was conducted on the 40,000 acre project area. Open motorized routes (roads and trails) were buffered at three scales (also referred to as distance bands) to display the amount of National Forest acreage within the buffers. The three distance bands applied included: a) acres and percent of the project area within 660 feet of open motorized routes, b) acres and percent of the project area greater than ½ mile from an open motorized route, and c) acres and percent of the project area greater than one mile from an open motorized route. Hillis et al. (1991) defined elk security habitat for forested stands greater than 250 acres in size and greater than ½ mile from an open route. Rowland et al. (2000) determined that the distance of 1,969 yards (1,800 meters) is equivalent to that at which elk response to open roads diminished markedly. Therefore, acreage greater than one mile from an open motorized route is assumed to provide greater security habitat for elk than the ½ mile distance.

**Evaluation Criteria and Comparison Measures**

Evaluation criteria are developed to illustrate the effects to wildlife and how those effects differ by alternative. In this analysis, commercial thinning and fuels treatments are the major impacts to habitat quality, quantity and species life needs. Using the same units of measure allows the major impacts to be easily understood and compared, providing the Decision Maker the necessary data to make an informed decision.

***Key Issue #1*:** The proposed action returns ponderosa pine in ponderosa pine and mixed conifer plant association groups to a more open condition favoring species such as the white-headed woodpecker and creating habitat conditions less desirable for other species such as accipiter hawks and big game that tend to favor denser, often multi-layered stands.

Alternatives develop less habitat for white-headed woodpeckers and more for other species. The Wildlife TES section analyzes the effects to white-headed woodpecker habitat and the MIS section covers the effects to the various accipiter habitats. Effects to mule deer and elk are covered in the Big Game section. The focus for big game is amount and distribution of habitat remaining post harvest.

> ***Units of Measure:*** Acres of suitable nesting habitat for white-headed woodpecker and accipiter hawks over time. Acres of hiding cover remaining after treatment for big game.

***Key Issue #2*:** Existing ponderosa pine-dominated stands are heavily infected with dwarf mistletoe in all size classes providing marginal white-headed woodpecker habitat in the short term. In the long term, mortality of the overstory trees and their replacement creates a gap-in-time that can span decades before larger trees are available. Alternatives treat the mistletoe stands differently and in differing amounts.

Forested Vegetation looks at the effects to the growth and development of ponderosa pine under each alternative. The wildlife TES section analyzes effects to habitat for white-headed woodpeckers.

***Units of Measure:*** Acres of suitable nesting habitat for white-headed woodpecker over time.

***Key Issue #3*:** The existing condition in lodgepole pine stands is a result of insect outbreaks, salvage logging, and fire suppression. The stands provide poor habitat with high levels of mistletoe and low levels of diversity. Proposed treatments would develop future black-backed woodpecker nesting habitat. Some of these stands also serve as current suitable habitat for the black-backed woodpecker and marten. Alternatives vary by amount of habitat treated and resulting habitat over time. Forested Vegetation looks to the growth and vegetation diversity effects of treatments. The wildlife MIS section analyzes effects to habitat for black-backed woodpeckers and marten.

***Units of Measure****:* Acres of suitable nesting habitat for black-backed woodpeckers over time and acres of marten denning habitat over time.

***Key Issue #4*:** The proposed action prescribes fire only in commercial treatment units in the project area. Additional ponderosa pine stands are in a condition to initiate a frequent fire regime reducing brush and improving white-headed woodpecker nesting habitat. Alternatives include additional prescribed fire only treatments. The wildlife TES section analyzes effects to white-headed woodpecker habitat over time.

***Units of Measure:*** Acres of suitable nesting habitat for white-headed woodpecker over time.

**Other Assumptions**
Modeling was completed to year 2018 to simulate post harvest conditions and 2058 for conditions 40 years post harvest. It is assumed that the time span is sufficient to show most habitat development trends.

Modeling does not take into account losses to insect, disease or fire and assumes no further treatments through the time period 2018 to 2058.

**Redundant Analysis**
In order to be efficient with time and funds where-ever possible, species with similar habitats were combined or effects referred to and not repeated. Analyses are sufficient to disclose effects to the public and for the decision maker to make an informed decision.

Occurring in the Rim-Paunina project area are the recreational trails from the Three Trails OHV project. Initiated in 2011, the Three Trails OHV project restricts off-trail OHV traffic to specific roads and trails, some of which are within a portion of the Rim-Paunina project area. Impacts from this recreational traffic on designated roads are an existing condition to the habitats found in the Rim-Paunina project area. A 660 foot buffer on the trails has been integrated into the project analysis to take into account any impacts OHV noise would have on wildlife. Where avian habitat within the Rim-Paunina project area is two percent or less within the Three Trails OHV system buffers analysis, primarily Birds of Conservation Concern and Landbird Focal Species, those impacts were not included. It is part of the existing condition, and no additional road closures or trail construction is proposed with the Rim-Paunina project. For a detailed analysis of vehicle and OHV effects on these and other species refer to the Three Trails OHV Project FEIS (2010) available at:
http://data.ecosystem-management.org/nepaweb/nepa_project_exp.php?project=26312.

**Summary of Wildlife Effects**
The Rim-Paunina project area is comprised mostly of ponderosa pine and lodgepole pine forests with some mixed conifer on Walker Rim. Past vegetation management actions have included salvage of beetle

killed lodgepole pine, and selection and regeneration harvest within pine and mixed conifer stands. Wildfires have also been actively suppressed which have also contributed to the current condition of this landscape. While these actions have provided increased vegetative diversity and benefited some wildlife species, they have also decreased habitat for the animal species that evolved in the fire, insect and disease conditions endemic to this area. In general, these actions have resulted in a landscape extremely susceptible to insect infestation, disease and high intensity wildfire.

While disturbance from insects, disease or wildfire is a part of the ecology for all forests and necessary for many wildlife species, disturbance events are best kept within proportion to historical occurrence. The increased vegetation density due to past management and fire suppression has resulted in higher levels of insects, disease and fuel loads, which increase the likelihood of high intensity fires that would remove most of the components of a mature forest. The cycle of natural fire recurrence of the Rim-Paunina area ranges from zero to 15 years (J. Dillon per. comm. 2011). The repetitive disturbance from fire resulted in a combination of lodgepole and mixed conifer forests with varying degrees of understory in a matrix of large and old-growth trees with an open canopy. This historic forest type was habitat for species that are now on the Threatened, Endangered and Sensitive Species list - White-headed woodpecker, Lewis's woodpecker, as well the Management Indicator Species such as the Williamson's sapsucker and Northern flicker and Bird Conservation Concern and Landbird Focal species such as pygmy nuthatch and flammulated owl.

***Ponderosa pine mistletoe***

Ponderosa pine stands within Rim-Paunina vary widely as a result of past harvest and fire suppression. The resulting stands vary from large open ponderosa pine that has had recent fire to dense stands of ponderosa pine heavily infected with mistletoe. Ponderosa pines heavily infected with dwarf mistletoe have substantially lower growth rates than uninfected trees. Severely infected trees may be sufficiently weakened that they are killed outright, or they may be predisposed to mortality caused by other agents.

Roth (1971; 1974) found that uninfected seedlings were taller than infected individuals after 12 years of observation. Severely infected small trees, especially on poor sites, are unlikely to develop normally, as height and diameter growth are. Groups of severely infected trees would become stunted. Most importantly, loss of natural disturbance regimes, as well as direction to both retain infected large trees and manage stands to an uneven age structure, would increase the incidence and severity of western dwarf mistletoe.

Probability of dwarf mistletoe infection is largely a function of the infection hazard and the size of the susceptible seedling; the larger the individual, the greater the probability of intercepting ejected mistletoe seeds. For years, pest management specialists have recommended that an infected overstory should be killed or removed before the new understory reaches this size/age threshold. Conversely, excessive levels of mistletoe will effect stand growth and increase the risk of catastrophic fire (Schmitt 1996).

Reynolds et al. (1992) puts this in the proper context with recommendations for managing stands for the northern goshawk in the southwestern United States. While some of the changes induced by mistletoe infestation on ponderosa pine stands benefit a variety of wildlife, over time, mistletoe related changes can be detrimental to some goshawk prey species, and are not desirable in post-fledging family and foraging areas. As an example, severely infected stands may stagnate and not develop to late and old structure. The risk of stand replacement fire is much greater in severely-infected stands and should be a primary concern where wildlife use values are high (Schmitt 1996).

Endemic levels of insects and pathogens can play significant ecological roles causing tree mortality, defoliation, decay, or deformity, that are often important attributes for goshawk nesting or foraging.

***Species Summary***

The proposed treatments and alternatives affect wildlife species in different ways. While developing habitat for white-headed woodpeckers, they would reduce habitat for goshawk. While improving the resilience and size of lodgepole pine for future black-backed woodpeckers, existing habitat for the black-back woodpeckers, marten, and mule deer are reduced. The following table summarizes the acres of habitat by alternative and over time for the majority of species with habitat affected by the project. Habitat and changes over time were modeled using Viable Ecosystems Modeling. The complexity of analysis that follows this section shows that there are trade-offs when managing wildlife habitat but wildlife species are not necessarily winners if habitat is gained or losers if habitat is lost. Treatments result in a more resilient landscape, more closely resembling the historic range of variability that the species developed in and a landscape returning to a more frequent fire regime reducing risk to all habitats and in which all species benefit in the long term.

**Table 21. Viable Ecosystem Modeling Projection of Reproductive Habitat (Denning and Nesting) in Acres over Time or Big Game Hiding Cover Post-treatment**

| Modeled Year | 2010 | Year 2018 | | | | | Year 2058 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **Existing Condition (Acres)** | **Alt. A** | **Alt .B** | **Alt. C** | **Alt. D** | **Alt. E** | **Alt. A** | **Alt. B** | **Alt. C** | **Alt. D** | **Alt. E** |
| **TES** | | | | | | | | | | | |
| Fisher | 3,502 | 4,943 | 4,295 | 4,351 | 4,255 | 4,056 | 14,040 | 11,463 | 11,842 | 11,551 | 11,075 |
| Lewis's Woodpecker | 1,041 | 632 | 1,309 | 1,241 | 1,182 | 1,281 | 334 | 1,211 | 1,131 | 1,090 | 1,244 |
| White-headed Woodpecker | 1,090 | 786 | 1,643 | 1,565 | 1,487 | 1,700 | 424 | 1,803 | 1,697 | 1,602 | 1,745 |
| **MIS - Not listed in TES** | | | | | | | | | | | |
| Goshawk | 7,350 | 8,989 | 7,325 | 7,439 | 7,279 | 5,931 | 28,355 | 24,167 | 25,157 | 25,371 | 24,300 |
| American Marten | 2,898 | 4,814 | 3,475 | 4,018 | 4,016 | 3,406 | 12,661 | 11,284 | 11,512 | 11,506 | 11,275 |
| Cooper's Hawk | 5,439 | 6,891 | 5,844 | 5,915 | 5,816 | 5,519 | 20,260 | 16,455 | 17,411 | 17,854 | 16,336 |
| Black-backed Woodpecker | 21,313 | 23,806 | 21,178 | 21,959 | 21,919 | 20,648 | 25,442 | 24,344 | 24,538 | 24,538 | 24,299 |
| Pileated Woodpecker | 1,412 | 2,096 | 1,984 | 2,008 | 1,993 | 1,926 | 5,454 | 4,897 | 4,959 | 4,928 | 4,830 |
| Williamson Sapsucker | 1,094 | 789 | 1,646 | 1,537 | 1,491 | 1,707 | 425 | 1,829 | 1,723 | 1,628 | 1,771 |
| Northern Flicker | 1,553 | 1,756 | 2,568 | 2,504 | 2,427 | 2,259 | 953 | 2,397 | 2,281 | 2,184 | 2,318 |
| Great Gray Owl | 6,173 | 8,626 | 9,171 | 9,170 | 8,923 | 8,835 | 17,865 | 18,009 | 18,165 | 17,615 | 17,049 |
| Big Game Hiding Cover | 24,259 | 24,259 | 18,021 | 16,940 | 16,940 | 16,020 | **Not Modeled Out to 2058** | | | | |
| **Birds of Conservation Concern and Land Bird Focal Species not in TES or MIS** | | | | | | | | | | | |
| Flammulated Owl | 4,780 | 6,410 | 7,303 | 7,293 | 6,991 | 7,071 | 13,546 | 14,319 | 14,381 | 13,835 | 13,423 |
| Pygmy Nuthatch | 5,022 | 6,669 | 7,556 | 7,494 | 7,245 | 7,319 | 14,265 | 15,010 | 15,075 | 14,525 | 14,100 |
| Chipping Sparrow | 3,206 | 3,647 | 5,451 | 5,328 | 5,067 | 5,134 | 4,957 | 6,366 | 6,329 | 6,236 | 6,205 |
| Brown Creeper | 6,176 | 8,630 | 9,176 | 9,175 | 8,928 | 8,840 | 17,880 | 18,040 | 18,196 | 17,645 | 17,080 |
| Hermit Thrush | 1,055 | 1,233 | 1,148 | 1,158 | 1,156 | 1,134 | 2,662 | 2,481 | 2,507 | 2,501 | 2,437 |
| Olive-sided Flycatcher | 9,909 | 10,569 | 12,076 | 11,958 | 11,695 | 11,472 | 5,353 | 7,652 | 7,361 | 7,272 | 7,280 |

## Threatened, Endangered and Sensitive Species

### Introduction

This Biological Evaluation (BE) has been prepared in compliance with the requirement of Forest Service Manual (FSM) 2630.3/ FSM 2670-2671, FSM W.O. Amendments 2600-95-7, and the Endangered Species Act (ESA of 1973, as amended). Species classified as sensitive by the Forest Service are to be considered by conducting biological evaluations to determine potential effects of all programs and activities on these species (FSM 2670.32). The BE is a documented review of Forest Service activities in sufficient detail to determine how a proposed action may affect sensitive wildlife species. The document becomes part of the analysis file.

The Deschutes and Ochoco National Forests completed a Joint Terrestrial and Aquatic Programmatic Biological Assessment (BA, USDA and USDI, 2010-2013) in July 2010 for Federal Lands within the Deschutes and John Day River Basin's administered by the Deschutes and Ochoco National Forests. A letter of concurrence was received from the U.S. Fish and Wildlife Service (USFWS) in September 2010 that agreed with the effects determination in the programmatic document. Every project that meets the project design criteria (PDCs) applicable to each affected species is covered by this document. If every PDC is not followed, then additional consultation may be needed and an effects determination made to determine the need for further consultation with the USFWS. The BA covers the northern spotted owl (*Strix occidentalis caurina*) as a threatened species and the 2008 designation of Critical Habitat and the Oregon spotted frog (*Rana pretiosa*) that is currently a federal candidate for listing.

### Description of Affected Species and Environmental Consequences

The federally listed species analyzed in this document include the northern spotted owl (*Strix occidentalis caurina*). The Oregon spotted frog (*Rana pretiosa*), Pacific fisher (*Martes pennanti*), and the North American wolverine (*Gulo gulo*) are federal candidates for ESA listing and are also on the Region 6 Regional Forester's Sensitive Species list.

Threatened, Endangered, and Federal Candidate Wildlife Species (Table 22) displays those species that are currently federally listed or candidates on the Deschutes National Forest and whether the species has been documented to occur within the Rim-Paunina project area.

**Table 22. Threatened, Endangered, and Federal Candidate Wildlife Species Documented to Occur or May Potentially Occur Within the Rim-Paunina Project Area**

| Species | Listing Status | Habitat | Presence Within Rim-Paunina Project Area |
|---|---|---|---|
| Northern Spotted Owl (*Strix occidentalis caurina*) | Federal Threatened | Old Growth Mixed Conifer Forest | Outside the Range |
| Oregon Spotted Frog (*Rana pretiosa*) | Federal Candidate and Regional Forester Sensitive | Ponds, Marshes | No Habitat |
| Pacific Fisher (*Martes pennanti*) | Federal Candidate and Regional Forester Sensitive | Mixed Forest with Complex Structure | Unknown |
| North American Wolverine (*Gulo gulo luscus*) | Federal Candidate and Regional Forester Sensitive | Alpine, Subalpine, Rock Talus, High Cirque Basins | Unknown |

**Table 23. Summary of Conclusion of Effects for Threatened, Endangered, and Federal Candidate Wildlife Species, Rim-Paunina Project Area**

| Species/Habitat | Alt. B | Alt. C | Alt. D | Alt. E |
|---|---|---|---|---|
| Northern Spotted Owl | NE | NE | NE | NE |
| Northern Spotted Owl Critical Habitat | NE | NE | NE | NE |
| Oregon Spotted Frog | NI | NI | NI | NI |
| Pacific Fisher | MIIH | MIIH | MIIH | MIIH |
| North American Wolverine | NI | NI | NI | NI |

NE = No Effect
NLAA = May Effect, Not Likely To Adversely Affect
BI = Beneficial Impact
NI = No Impact
MIIH = May impact individuals or hábitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species

## Summary Conclusions for Threatened and Endangered Species and Federal Candidates

1. Alternatives B, C, D, and E would have **"No Effect"** on the northern spotted owl and northern spotted owl critical habitat.
2. Alternatives B, C, D and E would have "**No Impact**" on the Oregon spotted frog and North American wolverine.
3. Alternatives B, C, D and E would result in a determination of **"May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species"** for the Pacific fisher**.**

Note: Where there was a "No Impact" determination, it was concluded the Rim-Paunina project either does not have the habitat for a particular species, or the zone of influence and its activities do not have the potential to overlap the biological needs of an individual, or a combination of both. Disclosure of effects associated with past activities in an incremental account is not the most informative manner in which to disclose effects. Discussion of wolverine is found in the Sensitive Species section of this chapter.

## Northern Spotted Owl, *Federal Threatened, Management Indicator Species*

In June 1990 the U.S. Fish and Wildlife Service listed the northern spotted owl as a threatened species and critical habitat was designated in 1992. Critical Habitat for the spotted owl was revised in 2008. The northern spotted owl was also designated as a Management Indicator Species for the Deschutes National Forest (USDA 1990). Spotted owls generally require habitats of mature or old growth coniferous forest with complex structure. Nesting, roosting, and foraging (NRF) habitat includes stands of mixed conifer, ponderosa pine with white fir understory and mountain hemlock with subalpine fir. Nest sites are generally in tree cavities in the boles of live trees or snags; however, abandoned raptor nests, broken treetops, or mistletoe brooms can be used as nest structures, but generally less frequently. Foraging habitat consists of relatively heavy canopy structure with a semi-open understory. Prey species include flying squirrels, wood rats, tree voles, and other small nocturnal or crepuscular creatures.

### Direct, Indirect, Cumulative Effects and Determination

Because the Rim-Paunina project area is located outside the range of the northern spotted owl and the 2008 Critical Habitat boundaries, there would be no direct, indirect, or cumulative effects to the species or critical habitat. Therefore, the selection and implementation of any alternative would lead to a determination of **"No Effect"** to the northern spotted owl and designated critical habitat and would not contribute to a negative trend in viability on the Deschutes National Forest.

**Oregon Spotted Frog *(Rana pretiosa), Federal Candidate, R6 Sensitive***

The Oregon spotted frog (*Rana pretiosa*) is currently listed as a federal candidate species by the United States Fish and Wildlife Service (USFWS). Spotted frogs have a historic distribution that covers a small part of western North America, from southern British Columbia to northeastern California, and from the west side of the Willamette Valley to the east side of the Klamath Basin in Oregon. They have been extirpated in much of their range by introduction of the bullfrog (*Rana catesbeiana*) and habitat alteration, loss through intensified agriculture, grazing, and urbanization (USGS 2003). Pearl (pers. comm. 2008) remarked that central Oregon including Big Marsh on the Crescent Ranger District and Sunriver south of Bend, seem to represent strongholds for the species and have the largest populations in the state of Oregon.

**Ecology:** Oregon spotted frogs are associated with wetland complexes greater than four hectares (10 acres) in size with extensive emergent marsh coverage that warms substantially during seasons when Oregon spotted frogs are active at the surface and sites always include some permanent water juxtaposed to seasonally inundated lands (Pearl and Hayes 2004 cited in Cushman and Pearl 2007). They use shallow oviposition sites consistently across their range with average depths per site ranging from 2.3 inches to 10 inches in depth (Pearl and Hayes 2004). Oviposition usually occurs between mid-February and mid-April depending on water temperature. The diet of the Oregon spotted frog includes arthropods (e.g. spiders, insects), earthworms, and other invertebrate prey. In turn, they may be preyed upon by mink, river otter, herons, bitterns, corvids, and garter snakes. Threats to the species were hypothesized by Cushman and Pearl (2007) to include direct loss and conversion of marsh habitats, interactions with non-native fishes, plant succession and other vegetation changes, livestock grazing, degraded water quality, isolation from other populations, and drought.

**Existing Condition**: Within the Rim-Paunina project area permanent water sources are limited to several narrow drainages, east of the Two Rivers North housing subdivision that flow eastward into the Five Mile Draw near Highways 58 and 97, and Boundary Springs located in the northeastern part of the project area. During the summer months most of the water present near Two Rivers North goes subsurface and only a few, small ponds provide standing water during the warmest part of the year. Oregon spotted frogs have never been detected in these ponds. The nearest known Oregon spotted population is located along the Little Deschutes River approximately ½ mile to the west of the western Rim-Paunina project boundary.

### *Environmental Consequences*

**Effects Common to All Alternatives**

None of the alternatives propose silvicultural or fuels treatments within wetland habitat of the project area. In addition, Oregon spotted frogs are not known to occupy any of the wetland habitats in the project area based on field reconnaissance that has occurred in the last decade. Therefore, implementation of any alternative is not expected to negatively affect any wetland habitat or any population of Oregon spotted frogs. Consequently, the determination is **"No Impact"** to the Oregon spotted frog. The Rim-Paunina project is consistent with all Project Design Features (PDFs) listed in the 2010-2013 Joint Aquatic and Terrestrial Programmatic Biological Assessment for Federal Lands in the Deschutes and John Day River Basin's Administered by the Deschutes and Ochoco National Forests (USDA 2010). Because no effects would occur there are also no cumulative effects to the species.

**Pacific Fisher *(Martes pennanti), Federal Candidate, R6 Sensitive***

The U.S. Fish and Wildlife Service (USFWS) was issued a court order in April 2003 to conduct a 90 day finding on a petition to list a distinct population segment of the fisher. In July, 2003, the USFWS published a 90 day finding that substantiated a listing may be warranted and began a 12 month status review. In April, 2004, the USFWS determined the fisher in Washington, Oregon and California is a "distinct population segment" of the entire fisher species. The USFWS determined the fisher faces

significant biological threats sufficient to warrant listing but is precluded by other higher priority listing actions (Federal Register Vol. 69, No. 68). Threats to the fisher include loss and fragmentation of habitat, mortalities and injuries from incidental captures, decreases in prey base, increasing human disturbance, and small isolated populations. An Interagency Fisher Conservation Assessment and Strategy document produced by the Interagency Fisher Biology Team has been completed (Lofroth et al. 2010). This four volume set assesses the current status of fishers on the west coast, including the synthesis of habitat and evaluation of threats. The goals of the strategy are to provide recommendations to restore and/or maintain habitat conditions that can support fishers, re-establish fisher populations and restore connectivity by creating and managing for resilient landscapes throughout the west coast assessment area.

**Ecology**

The fisher is a house-cat sized member of the Mustelidae family which includes weasels, mink, marten, and otters. Their occurrence is closely associated with low- to mid-elevation forests (generally less than 1250 m) with a coniferous component, large snags or decadent live trees, and logs for denning and resting, and complex physical structure near the forest floor to support adequate prey populations (Powell and Zielinski 1994). Rosenberg and Raphael (1986 cited by Kremaster and Bunnell in Rochelle et al. 1999) stated the fisher was negatively associated with edges at all scales of measurements and could be considered a forest interior species. However, fishers also venture into openings to feed (reviews of Buskirk and Powell 1994 and Martin 1994 cited by Kremaster and Bunnell 1999 in Rochelle et al. 1999).

Within a given region, the distribution of fishers is likely limited by elevation and snow depth and fisher are unlikely to occupy habitats in areas where elevation and snow depth act to limit their movements for traveling and hunting (Krohn et al. 1997 cited by USFWS 2004; Lofroth et al. 2010). In mid-elevation areas with intermediate snow depth, fishers may use dense forest patches with large trees because the overstory increases snow interception (Weir 1995 cited by USFWS 2004). Aubry and Houston (1992 cited by Powell 1993) felt that snow affected fisher distribution and population density in Washington State.

Prey item remains collected in Oregon include snowshoe hare, brush rabbit, California ground squirrel, Douglas' squirrel, northern flying squirrel, woodrats, opossum, striped skunk, porcupine (male fishers only), bobcat, deer, elk, Stellar's jay, pileated woodpecker, and hairy woodpeckers (Aubry and Raley 2002). Fishers are fast, agile and adept at climbing trees and would eat any prey they can catch and overpower, including squirrels, hares, mice, birds, and porcupines. Although adapted for climbing, fishers are primarily terrestrial. When inactive, the fisher occupies dens in tree hollows, under logs, in-ground or rocky crevices, or rests in the branches of conifer trees during the warmer months. Female fishers give birth and raise kits in cavities in large-diameter (greater than 80 cm, 31 inches dbh) live trees, snags, and logs, and use these structures and large platform branches for rest sites (Powell and Zielinski 1994; Aubry and Raley 2002). In the western USA, fishers generally avoid clearcuts and forested stands with less than 40 percent canopy cover (Buck et al. 1994; Jones and Garton 1994 cited by Aubry and Lewis 2003). Powell (1993) reported that open habitat vegetated with young deciduous trees and shrubs typical of clear-cut areas, are used by fishers in summer but are truly open with no overhead cover in winter. Aubry and Raley (2006) in a study area in the southern Oregon Cascades determined that mean home ranges for adult females was 25 square kilometers (10 square miles) and for males averaged 62 square kilometers (24 square miles) during the non-breeding season) and 147 square kilometers (57 square miles) during the breeding season.

Prior to extensive European settlement, fishers occupied most coniferous forest habitats in Washington, Oregon, and California (Aubry and Lewis 2003). Lofroth et al. (2010) reproduced a map by Gibilisco (1994) that showed the presumed historical range of fishers in North America that included western Oregon, the east and west Cascade Range in Oregon and the entire border with Washington State. Extensive trapping in the 1800s and 1900s is frequently cited as the principal initial cause of the

substantial reduction of the range of the fisher in Washington, Oregon, and California (Federal Register Vol. 69, No. 68). Claar et al. (1999) stated that trapping may affect local populations and even light pressure may cause local extinction. Claar et al. (1999) also stated there is evidence that western fisher populations have lower natality and high natural mortality rates as compared to eastern populations. He recommended in travel planning, managers should consider ramifications of increased trapper access and distribution.

The extent of past timber harvest is one of the primary causes of fisher decline across the United States (Powell 1993 cited in USFWS 2004) and may be one of the main reasons fishers have not recovered in Washington, Oregon, and portions of California as compared to the northeastern United States (Powell and Zielinski 1994). Habitat fragmentation has contributed to the decline of fisher populations because they have limited dispersal distances and are reluctant to cross open areas to re-colonize historical habitat (USFWS 2004). Fishers have a low annual reproductive capacity; not all females produce young every year and litters usually consist of two to three kits raised entirely by the female. In addition, recent evidence suggests only juvenile males disperse long distances which would affect the rate at which fishers may be able to colonize formerly occupied areas within its historical range (Aubry et al. 2003). Fishers are estimated to live up to 10 years (Powell 1993).

**Existing Condition**

Gibilisco (1994) described the presumed historical range of fishers including lands within the state of Oregon. The eastern extent included the eastern portion of the Cascade Range to Bend and southward to Paulina Peak, Walker Rim, and lands in the Fremont-Winema National Forest. Lofroth et al. (2010) used these boundaries for their assessment area based on the known and historical range of fishers. In Oregon, the fisher has been extirpated from all but two portions of its historical range (Aubry and Lewis 2003). Within Oregon the two known extant populations are in the southwestern portion of the state: one in the southern Cascade Range that was established through reintroductions of fishers from British Columbia and Minnesota that occurred between 1961 and 1981, and one in the northern Siskiyou Mountains of southwestern Oregon presumed to be an extension of the population in northern California. Genetic testing has revealed the populations are isolated from each other (Aubry et al. 2002). The same study revealed juvenile male fishers are capable of long distance dispersal with one collared male relocating to the Crescent Ranger District in the summer of 1999 having traveled fifty-five kilometers (34 miles) from the point of capture on the Rogue River National Forest. The radio signal from this animal was lost in December 1999 north of Big Marsh due to battery failure.

Anecdotal information suggests that a few trappers target beaver, coyotes, and marten on the Crescent District including all or portions of the Rim-Paunina project area. It is currently unknown if any fishers have been unintentionally captured during lawful trapping seasons for other species.

Carnivore surveys were conducted on the Crescent District in 1993-1996 and 1998, and the winter of 2010-2011 using bait with camera sets, snow tracking and track plates. There were no detections of fishers or wolverine from these surveys although marten were confirmed. As previously mentioned, the United States Fish and Wildlife Service (USFWS) cite Krohn et al. (1997) as saying the distribution of fishers is likely limited by elevation and snow depth and the species is unlikely to occupy habitats where elevation and snow depth act to limit their movements. At the present time it is unknown if the average annual snow depths and the high elevation of the Crescent Ranger District (>4,400 feet) and within the Rim-Paunina project area (4,500 to 7,080 feet) can support year-round fisher occupancy. If currently present on the district, they may have to include lower elevation forest with less snow on the Bend-Ft. Rock Ranger District of the Deschutes National Forest or the adjacent Rogue River-Siskiyou, Umpqua, or Willamette National Forests as part of their home ranges.

Suitable fisher denning habitat for this project was defined as forested stands with greater than 20 inch diameter trees in lodgepole pine, ponderosa pine, white fir, Shasta red fir, and mountain hemlock plant association groups (PAGs) having a dense canopy greater than 40-55 percent depending on the plant association group. Using this definition the Viable program estimated there is currently 3,502 acres of potential denning habitat in the Rim-Paunina planning area. This figure accounts for all past and present timber sales, natural events such as wildfires, and any other habitat altering activity. The majority of this potentially suitable denning habitat is located in a relatively contiguous, but narrow strip along the west slope of Walker Mountain on the eastern project area boundary. Figure 5 below shows pacific fisher denning habitat using green tree data from Viable and also shows where snag densities greater than 20 inches dbh and greater than 6.2/acre overlap with modeled denning habitat. This would represent the highest quality denning habitat in the project area, though snag densities less than 6.2/acre could still provide denning habitat.

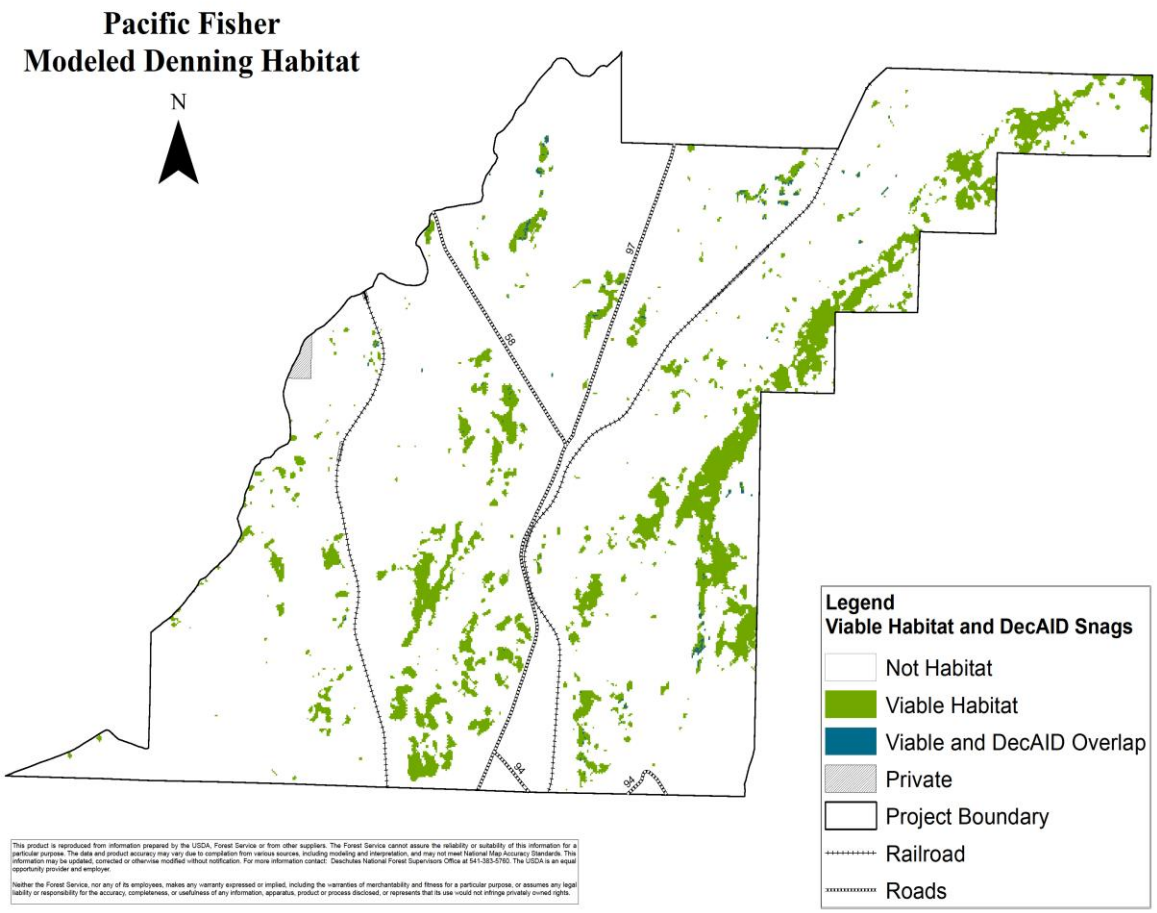



**Figure 5. Pacific Fisher Denning Habitat Modeled Using Green Tree Data (Viable) that Overlaps with DecAID Snag Data**

An Aubry and Raley (2006) study on southwestern Oregon seemed to suggest the Rogue River and a 2-lane highway corridor influenced spatial use and distribution of fishers in their study area. Their radio collared fishers established home ranges on one side or the other of the corridor. However, males regularly crossed the corridor during the breeding season, and the corridor did not appear to impede juvenile dispersal. Two highways (97 and 58) bisect the Rim-Paunina project area and may limit female

fisher presence to either side of the highways though males may cross during the breeding season as suggested in Aubry and Raley's 2006 study.

Table 24 displays the range of tolerance intervals for fishers based on snag levels taken from DecAID. 1,795 acres of the 3,502 acres of current denning habitat (51%) does not have snags >20 inches dbh and is less likely to support denning females. For the 0-50 percent tolerance interval, modeling shows 1,633 acres (47%) of the mapped denning habitat has 0-6.2 snags/acre greater than 20 inches dbh. This tolerance interval is more likely to support denning females than the acreage showing no snags/acre greater than 20 inches dbh. Only 75 acres (2%) of the denning habitat has greater than 6.2 snags/acre greater than 20 inches dbh and would equate to the higher quality denning habitat in the project area. Project Design Features in Chapter 2 disclose the limited circumstances where snag felling may be needed during project implementation.

**Table 24. Tolerance Intervals for the pacific Fisher and Snag Use**

| **Pacific Fisher 3,502 Acres** | | **Density of Snags ≥ 20" dbh by tolerance interval** | | |
|---|---|---|---|---|
| **Tolerance Interval*** | | **0%** | **0-50%** | **50%+** |
| **Density (#/hectare)*** | | **0** | **0-15.3** | **15.3+** |
| **Density (#/acre)** | | **0** | **0-6.2** | **6.2+** |
| **% of Habitat** | | 51% | 47% | 2% |
| **Acres** | | 1,795 | 1,633 | 75 |

### *Environmental Consequences*

Because fishers are known to be susceptible to trapping and motorized access can increase the risk of capture, an analysis of disturbed versus undisturbed denning habitat was conducted. Table 25. Acres of displays the amount of disturbed versus undisturbed fisher denning habitat in the Rim-Paunina planning area. A 660 foot buffer was applied to each side of a road or trail open for motorized use to determine disturbed habitat.

**Table 25. Acres of Disturbed and Undisturbed Potential Fisher Denning Habitat in the Rim-Paunina Planning Area**

| Current Acres of Potential Denning Habitat | Undisturbed Denning Habitat | Disturbed Denning Habitat |
|---|---|---|
| 3,502 | 1,909 – 55% | 1,593 – 45% |

### Alternative A – No Action

### Direct and Indirect Effects

There would be no direct impacts to fishers or their habitat with selection of this alternative because no trees, snags, or down logs would be removed from existing denning habitat. Fishers, if currently present, could continue to utilize late and old structural stands in the planning area for foraging, denning, and as resting sites though, as shown in Table 25, 45 percent of the denning habitat is also within 660 feet of an open road or motorized trail defined as disturbed habitat. This level of motorized access would not be reduced which would maintain fisher risk of coming into contact with the recreating public during the furbearer trapping season. This could lead to incidental catch and mortality from trappers that are legally targeting other species such as coyotes and marten.

As shown in Table 26, with the absence of active forest management, the amount of the planning area that becomes suitable denning habitat in 2018 would increase to 4,943 acres and to 14,040 acres by 2058.

This is the result of increased tree growth and additional canopy layering particularly in the ponderosa pine and mixed conifer plant associations. However, the lack of active forest management would also make these stands much more susceptible to large-scale loss to wildfire, beetle outbreak or disease events that could lead to short- and long-term loss of habitat for the species.

**Effects Common to All Action Alternatives**

All action alternatives would result in silvicultural and fuels treatments conducted in potential denning habitat for the fisher. Commercial thinning and small diameter thinning would reduce tree densities in affected stands and likely reduce canopy cover below the 40 percent level defined as potential denning habitat. Post harvest canopy cover would range from 30-35 percent in the ponderosa pine and mixed conifer stands. It is assumed female fishers if present in the project area, would avoid treated areas for denning purposes for several decades or until canopy cover returns to the 40 percent or greater level. The benefits to conducting the commercial and small diameter thinning would reduce the risk of large tree and large scale loss of forest to a wildfire event, beetle outbreak or other disease issues. These events would potentially be more impactive to fishers than thinning depending on scale and intensity whereas with thinning, a 40 percent canopy cover level could return in a decade or two.

Prescribed fire is generally used in ponderosa pine plant associations to remove small diameter fuels, needle cast with minimal large tree loss, therefore, this action by would likely have minimal impact on fisher habitat. All action alternatives are expected to remove some trees infected with mistletoe which have been documented as providing resting sites for fishers (Lofroth et al. 2010) although complete mistletoe eradication within the project area would not occur.

None of the action alternatives propose the closure of any additional roads or motorized trails beyond those decided with the Three Trails OHV EIS decision (USDA 2010). In addition, no new permanent system roads would be constructed for the implementation of the Rim-Paunina project. However, all four action alternatives would require the construction of temporary roads to access treatment units that total 9.2 miles in Alternative B, 6.5 miles in Alternatives C and D, and 8.3 miles in Alternative E. Temporary road construction would have the capability of increasing short-term disturbance to fishers if present, but would have little effect long-term because of its small scale, its location within treatment units, its temporary nature, and the fact that temporary roads would be restored to a hydrological and native vegetative state likely within five years after completion of commercial treatments. Because no permanent road construction is proposed the percentage of disturbed versus undisturbed denning habitat would essentially remain the same for all action alternatives shown in Table 26.

Management actions also have the potential to cause disturbance which could temporarily displace individuals if they are dispersing through an active timber sale, prescribed burn site or where small diameter thinning is proposed. However, this disturbance would be localized to the particular activity and its associated acreage and implementation of the Rim-Paunina project would be spread out over five to six years. Undisturbed denning habitat would always be available to fishers, if present in the project area. All Rim-Paunina activities are expected to be completed by 2018.

Table 26 displays the amount of potential fisher denning habitat in the project area after the completion of all activities in each alternative and projected out to 2058. This assumes no further silvicultural or fuels treatments prior to 2058. As shown, all Action Alternatives (B, C, D, and E) are all relatively similar in the amount of suitable denning habitat available in 2018 and 2058. However, all action alternatives would have less denning habitat in 2018 and 2058 compared to Alternative A.

**Table 26. Acres of Disturbed and Undisturbed Fisher Denning Habitat in the Planning Area Projected out to Years 2018 and 2058 for Each Alternative**

| **Acres of disturbed and undisturbed fisher denning habitat in the planning area projected out to years 2018 and 2058 for each alternative(Current denning habitat is 3502 acres of which 1593 acres or 45% considered currently disturbed and 1909 acres or 55% currently considered undisturbed)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Alt. A** | | **Alt. B** | | **Alt. C** | | **Alt. D** | | **Alt. E** | |
| | Dist. | Undist. | Dist. | Undist. | Dist. | Undist. | Dist. | Undist. | Dist. | Undist. |
| **2018** | 2355 (48%) | 2588 (52%) | 1925 (45%) | 2370 (55%) | 1966 (45%) | 2385 (55%) | 1930 (45%) | 2325 (55%) | 1840 (45%) | 2216 (55%) |
| | 4943 ac total | | 4295 ac total | | 4351 ac total | | 4255 ac total | | 4056 ac total | |
| **2058** | 7368 (52%) | 6672 (48%) | 5706 (50%) | 5757 (50%) | 5958 (50%) | 5884 (50%) | 5811 (50%) | 5740 (50%) | 5535 (50%) | 5540 (50%) |
| | **14040 ac total** | | **11463 ac total** | | **11842 ac total** | | **11551 ac total** | | **11075 ac total** | |

**Alternative B**

**Direct and Indirect Effects**

The selection and implementation of this alternative would result in the retention of the second highest level of denning habitat in the project area of the four action alternatives for 2018 and third highest projected for 2058. Denning habitat would still be available to support individuals and/or pairs in the project area particularly near Walker Rim for both modeled time periods and also west of Highway 97 by 2058.

**Determination**

Timber harvest and fuels treatments actions have the potential to reduce canopy cover below the levels described as used by the species and may create short-term disturbance to animals that may occupy or be dispersing through the planning area. Modeling indicates a habitat increase by 2018 compared to the current condition in Table 25 and more than tripling denning habitat acreage by 2058, though fewer acres overall compared to the no action alternative. Therefore, the determination is **"May impact individuals or habitat, but will not likely contribute to a trend toward Federal listing or cause a loss of viability to the population or species"**.

**Alternative C**

**Direct and Indirect Effects**

The selection and implementation of this alternative would result in the greatest retention and future development of denning habitat of the four action alternatives for both time periods modeled. This is the result of less acreage proposed for treatment in Alternative C and forested lands that develop into suitability for both modeled time periods. Similar to Alternative B, denning habitat would be available for female fishers particularly east of Highway 97 near Walker Rim in 2018 and on both sides of Highway 97 by 2058 due to the increase in denning acreage.

**Determination**

Timber harvest and fuels treatments actions have the potential to reduce canopy cover below the levels described as used by the species and may create short-term disturbance to animals that may occupy or be dispersing through the planning area. Modeling indicates this alternative results in the greatest amount of denning habitat projected for 2018 and 2058 of the four action alternatives, though fewer acres overall compared to the no action alternative. Therefore, the determination is **"May impact individuals or**

**habitat, but will not likely contribute to a trend toward Federal listing or cause a loss of viability to the population or species"**.

**Alternative D**
**Direct and Indirect Effects**
The selection and implementation of Alternative D would result in effects relatively similar to Alternatives B and C particularly by the year 2018. In spite of the treatments, this alternative would still result in the second highest level of denning habitat of the four action alternatives projected for 2058. Similar to the other action alternatives, denning habitat would be available for female fishers on both sides of Highway 97 though reduced in amount compared to the no action alternative.

**Determination**
Timber harvest and fuels treatments actions have the potential to reduce canopy cover below the levels described as used by the species and may create short-term disturbance to animals that may occupy or be dispersing through the planning area. Modeling indicates a habitat increase by 2018 compared to the current condition in Table 25 and more than tripling denning habitat acreage by 2058, though fewer acres overall compared to the no action alternative. Therefore, the determination is **"May impact individuals or habitat, but will not likely contribute to a trend toward Federal listing or cause a loss of viability to the population or species"**.

**Alternative E**
**Direct and Indirect Effects**
The selection and implementation of this alternative would provide the least amount of denning habitat projected for years 2018 and 2058 due to Alternative E proposing the greatest amount of treatment acreage of the four alternatives. However, similar to the other action alternatives, suitable denning habitat is projected to more than triple by 2058 compared to the current level of 3,502 acres and result in an increasing trend assuming no further treatments occur in the time period modeled.

**Determination**
Similar to the other action alternatives, there is an increasing trend in denning habitat capability according the modeling results. However, timber harvest and fuels treatments actions would still reduce canopy cover below the levels described as used by the species and may create short-term disturbance to animals that may occupy or be dispersing through the planning area. Therefore, the determination is **"May impact individuals or habitat, but will not likely contribute to a trend toward Federal listing or cause a loss of viability to the population or species"**.

**Cumulative Effects**
Table 19 was reviewed for projects that have the capability to overlap in time and space within the zone of influence for Rim Paunina. The zone of influence was defined as the 40,000 acres of Deschutes National Forest lands within the Little Walker watershed (Rim-Paunina project area) because this land base may be capable of supporting four females and one male fisher using home range data from the Aubry and Raley study on the Rogue-Siskiyou National Forest fisher study (2006). There are no projects that overlap in time and space within the same zone of influence therefore; there are no additive cumulative effects.

Privately owned land in the planning area is limited to approximately 106 acres in the Two Rivers North housing subdivision at the west boundary of the project. None of this acreage would meet the definition of suitable denning habitat. Based on existing knowledge of species presence and habitat conditions available, cumulative effects are not expected to occur.

**Regional Forester's Sensitive Species**

Species classified as sensitive by the Forest Service are to be considered by conducting biological evaluations (BE) to determine potential effects of all programs and activities on these species (FSM 2670.32). The BE is a documented review of Forest Service activities in sufficient detail to determine how a proposed action may affect sensitive wildlife species.

The Regional Forester's Sensitive Species list was updated in January 2008 and Table 27 includes all animal species documented or suspected to occur on the Deschutes National Forest and their status within the Rim-Paunina vegetation project area using the 2008 updated list.

**Table 27. Regional Forester Listed Sensitive Animal Species for the Deschutes National Forest**

| Species | Listing Status | Habitat | Species Presence or Suitable Habitat Within Rim Paunina Project Area |
|---|---|---|---|
| Bald Eagle (*Haliaeetus leucocephalus*) | Regional Forester Sensitive Management Indicator Species | Lakes, Reservoirs, Large Trees for Nesting | Observations - No Known Nests |
| Horned Grebe (*Podiceps auritus*) | Regional Forester Sensitive | Lakes | No Habitat |
| Red-necked Grebe (*Podiceps gisegena*) | Regional Forester Sensitive | Lakes | No Habitat |
| Bufflehead (*Bucephala albeola*) | Regional Forester Sensitive | Lakes, Rivers, Snags | No Habitat |
| Harlequin Duck (*Histrionicus histrionicus*) | Regional Forester Sensitive | Fast Flowing Streams | No Habitat |
| American Peregrine Falcon (*Falco pergrinus anatum*) | Regional Forester Sensitive Management Indicator Species | Cliffs, Riparian | No Habitat |
| Tricolored Blackbird (*Agelaius tricolor*) | Regional Forester Sensitive | Lakeside, Bulrushes | No Habitat |
| Lewis' Woodpecker (*Melanerpes lewis*) | Regional Forester Sensitive Management Indicator Species | Open woodland habitat (oak, ponderosa, or cottonwood) near water, burned forests | Species Documented |
| White-headed Woodpecker (*Picoides albolarvatus*) | Regional Forester Sensitive Management Indicator Species | Ponderosa pine or mixed conifer forests dominated by ponderosa pine | Species Documented |
| Northern Waterthrush (*Seiurus aurocapillus*) | Regional Forester Sensitive | Riparian hardwoods (willows) | No Habitat |
| Western Sage Grouse (*Centrocercus urophasianus phaeios*) | Regional Forester Sensitive | Sagebrush | No Habitat |
| Yellow Rail (*Coturnicops noveboracensis*) | Regional Forester Sensitive | Marshes | No Habitat |
| North American Wolverine (*Gulo gulo luscus*) | Regional Forester Sensitive Management Indicator Species | Alpine, Subalpine, Rock Talus, High Cirque Basins | No Habitat |
| Pygmy Rabbit (*Brachylagus idahoensis*) | Regional Forester Sensitive | Sagebrush Flats | No Habitat |
| Townsend's Big-eared Bat (*Plecotus townsendii*) | Regional Forester Sensitive Management Indicator Species | Roost sites in buildings, caves and bridges | No Habitat |
| Crater Lake Tightcoil (*Pristiloma arcticum crateris*) | Regional Forester Sensitive | Springs, seeps, streams | Potential Habitat |

| Species | Listing Status | Habitat | Species Presence or Suitable Habitat Within Rim Paunina Project Area |
|---|---|---|---|
| Silver-Bordered Fritillary (*Boloria selene*) | Regional Forester Sensitive | Wet meadows, marshes, bogs and more open parts of shrubbier wetlands | No Habitat |
| Johnson's Hairstreak (C*allophrys johnsoni*) | Regional Forester Sensitive | Mostly in old growth coniferous forests with mistletoe presence | Potential Habitat |

After a review of existing observation records, habitat requirements, and existing habitat components, it was determined that the following sensitive species have habitat present in the project area or are known to occur and would be included in this analysis: Northern bald eagle (*Halaieetus leucocephalus*), Lewis' woodpecker (*Melanerpes lewis*), White-headed woodpecker (*Picoides albolarvatus*), Crater Lake tightcoil (*Pristiloma arcticum crateris*), and Johnson's hairstreak (*Callophrys johnsoni*).

**Summary of Conclusions for Sensitive Species**

1. There is no habitat present and/or the following species are not expected to occur within the project area: horned grebe, red-necked grebe, bufflehead, harlequin, peregrine falcon, Tricolored blackbird, northern waterthrush, western sage grouse, yellow rail, North American wolverine, pygmy rabbit, Townsend's big-eared bat, and silver-bordered fritillary.
2. Alternatives B, C, D, and E would result in a determination of "**Beneficial Impact**" to the Lewis' and white-headed woodpeckers.
3. Alternatives B, C, D, and E "**May Impact Individuals or Habitat, But Would Not Contribute to a Trend Toward Federal Listing or Loss of Viability To The Population or Species"** for the Johnson's hairstreak.

**Table 28. Summary of Conclusion of Effects to Region 6 Sensitive Animal Species.**

| Species | Alt. B | Alt. C | Alt. D | Alt. E |
|---|---|---|---|---|
| Bald Eagle | NI | NI | NI | NI |
| Horned Grebe | NI | NI | NI | NI |
| Red-necked Grebe | NI | NI | NI | NI |
| Bufflehead | NI | NI | NI | NI |
| Harlequin Duck | NI | NI | NI | NI |
| American Peregrine Falcon | NI | NI | NI | NI |
| Tricolor Blackbird | NI | NI | NI | NI |
| Lewis' Woodpecker | BI | BI | BI | BI |
| White-Headed Woodpecker | BI | BI | BI | BI |
| Northern Waterthrush | NI | NI | NI | NI |
| Western Sage Grouse | NI | NI | NI | NI |
| Yellow Rail | NI | NI | NI | NI |
| North American Wolverine | NI | NI | NI | NI |
| Pygmy Rabbit | NI | NI | NI | NI |
| Townsend's Big-Eared Bat | NI | NI | NI | NI |
| Crater Lake Tightcoil Snail | NI | NI | NI | NI |
| Silver-Bordered Fritillary | NI | NI | NI | NI |
| Johnson's Hairstreak | MIIH | MIIH | MIIH | MIIH |

NI = No Impact
MIIH = May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or loss of viability to the population or species
BI = Beneficial Impact

The following species were determined not to occur in the project area based on a lack of existing sighting information, a review of habitat requirements, and habitat types present in the project area: Horned grebe (*Podiceps auritus*), Red-necked grebe (*Podiceps grisgena*), Bufflehead (*Bucephala albeola*), Harlequin (*Histrionicus histrionicus),* Peregrine falcon (*Falco peregrines anatum*), Tricolored blackbird (*Agelaius tricolor),* Northern waterthrush (*Seiurus aurocapillus),* Western sage grouse (*Coturnicops noveboracensis*), Yellow rail (*Coturnicops noveboracensis*), North American wolverine (*Gulo gulo luscus*), Pygmy rabbit (*Brachylagus idahoensis),* Townsend's big-eared bat (*Plecotus townsendii*), and the Silver-bordered fritillary (*Boloria selene*).

**Horned and Red-Necked Grebes** - Both grebes nest in lakes and ponds with tall vegetation or marshy habitats. NatureServe gives the horned grebe in Oregon a listing of S2B, S5N – Imperiled Breeding, Secure Non-breeding and for the red-necked a ranking of S1B, S4N – Critically Imperiled-Apparently Secure Non-breeding. The project area does not contain any lakes or ponds that could potentially provide nesting habitat for either species. While the horned grebe has been documented to occur on Big Lava Lake on the Deschutes National Forest (Marshall et al. 2003) there are no known breeding locations of either species on the forest. Implementation of any alternative would have **"No Impact"** on the horned grebe and red necked grebe.

**Bufflehead** - The bufflehead is North America's smallest diving duck. It winters throughout Oregon but is an uncommon breeder in the central and southern Cascades (Marshall 2003). Known nest sites in central and southern Oregon include Hosmer Lake, Crane Prairie Reservoir, Twin Lakes, Wickiup Reservoir, Davis Lake and along the Little Deschutes River in Deschutes County. The bufflehead will use tree cavities or artificial nest boxes in trees close to water. Marshall (1996) stated that human disturbance from high recreation use at Cascade Lakes and a shortage of suitable nesting cavities due to forestry practices may be having an impact on their population status. The Oregon breeding population is considered sensitive by the ODFW because of its small size and limited nesting habitat (Marshall et al. 2003). NatureServe (2011) lists the Oregon status as S2B, S5N – Imperiled Breeding, Secure Non-breeding. There are no lakes, ponds, rivers, or reservoirs in the project area therefore, implementation of any alternative would have **"No Impact"** to the bufflehead nor result in any change in species viability on the Deschutes National Forest.

**Harlequin** - The Harlequin duck nests along fast-flowing rivers and mountain streams in the Cascade Mountains of Oregon and Washington. There are no confirmed breeding sites in the east Cascades of Oregon with the exception of the Hood River basin (Marshall et al. 2003). In the western Cascades of Oregon breeding pairs are observed on low to moderate gradient (1-7 percent) third to fifth-order streams in the western hemlock zone with simple channels and abundant in-stream rocks for loafing sites (Marshall et al. 2003). Threats to the species may include recreation related disturbances and oil spills. Direct effects of timber harvesting, mining, road building or other activities have not been documented (Marshall et al. 2003). NatureServe (2011) lists the harlequin in Oregon as S2B – Imperiled Breeding.

Potential breeding habitat may exist on the Crescent Ranger District in the upper Little Deschutes River canyon and Crescent Creek though the species has not been documented to occur. There is no potentially suitable nesting habitat in the Rim-Paunina project area. Implementation of any alternative would have **"No Impact"** to the harlequin nor result in any change in species viability on the Deschutes National Forest.

**Peregrine Falcon** - In Oregon, peregrine falcons occur as resident and migratory populations. They nest on cliffs greater than 75 feet in height and within one mile of some form of water (Pagel 1992). Nesting occurs in xeric areas of eastern Oregon, marine habitats of western Oregon, montane habitats to 6,000 feet elevation, small riparian corridors statewide, and more recently urban habitats of the lower Willamette

and Columbia Rivers. Riparian corridors are used for travel and as hunting areas (90-95 percent of all prey items are birds that may come from these systems (Pagel 1992). NatureServe (2011) lists the species status in Oregon as S2B – Imperiled-Breeding. While there is one known peregrine falcon eyrie located in 2008 on the Sisters Ranger District of the Deschutes National Forest none have been reported on the Crescent Ranger District. Within the Rim-Paunina project area there is no suitable cliff habitat that could function as nesting habitat. Implementation of any alternative would have **"No Impact"** on the peregrine falcon and would not contribute to a negative trend in viability on the Deschutes National Forest.

**Tricolored Blackbird** - This blackbird is a highly gregarious colonial breeder largely endemic to California. However, breeding colonies are scattered and intermittent in Oregon. In Oregon they breed most consistently in southern Klamath County in the southern part of the state. There are no records of nesting tricolored blackbirds in northern Klamath County where the Rim-Paunina project area is located. Nesting occurs in fresh-water marshes of cattails, tules, bulrushes and sedge, or in thickets of willows or other shrubs. Most birds in Oregon migrate to California for the winter. Threats to this species include habitat loss due to drainage of wetlands and conversion of former nest and roost sites to agriculture. Human disturbance has also been implicated in nesting colony abandonment or failure (Marshall et al. 2003). The Oregon population was estimated to have declined by 22 percent in the 1980s but the Oregon population represents only one percent of the total tricolored blackbird population (Beedy et al. 1999). NatureServe (2011) ranks the species in Oregon as SP 'Sensitive' (peripheral or naturally rare) and by the Natural Heritage program as G3 'Vulnerable' – either rare throughout its range or found locally in a restricted range. There are no documented sightings of tricolored blackbirds on the Crescent District. In addition, there is no potential nesting habitat for the species in the Rim-Paunina project area due to very limited riparian habitat, none of which have the willows, tules, sedges, or bulrushes used for nesting. Therefore, implementation of any alternative would have **"No Impact"** to the tricolored blackbird.

**Northern Waterthrush** - The northern waterthrush is a small neotropical migrant that travels long distances nocturnally. Breeding habitat in North America includes Alaska and west to east across Canada extending into New England, the Mid-Atlantic States, the Great Lakes region, Montana, Idaho, North Dakota (NatureServe 2008) and a small area in the central Cascades of Oregon. NatureServe ranks the species in Oregon as S2B – 'Imperiled-Breeding'. The species winters in the West Indies and Central and South America. On the Crescent Ranger District the species has been known to occur along Crescent Creek and the Little Deschutes River near the communities of Crescent and Gilchrist, Oregon since 1977 (Contreras 1988). The birds in central Oregon seem to prefer dense riparian willow thickets and were usually found in willow clumps five to eight feet high, with some Sitka alder intermixed with small grassy patches and pools of water left in old stream meanders, although no nests have been found (Contreras 1988). There is no suitable nesting habitat with dense willow thickets present in the Rim-Paunina project area. Therefore, the selection and implementation of any alternative would have **"No Impact"** to the northern waterthrush.

**Western Sage Grouse** - Sage grouse are found in foothills, plains, and mountain slopes where sagebrush is present and the habitat contains a mixture of sagebrush, meadows, and aspen in close proximity. Winter habitat containing palatable sagebrush probably is the most limited seasonal habitat in some areas (NatureServe 2011). While this habitat type and sage grouse are known to occur on the Deschutes National Forest, this habitat type does not occur within the project area or the Crescent Ranger District. Implementation of any alternative would have **"No Impact"** on the western sage grouse.

**Yellow Rail** - From information gathered over the last ten years, nesting habitat for the yellow rail in Oregon has been described as marshes or wet meadows which have an abundance of thin-leaved sedges, a layer of senescent vegetation to conceal their nests, and an average water depth of seven centimeters (Popper 2001). Winter habitat is thought to occur along the California coast although more research is needed to confirm this (Popper 2001). A very small breeding population of yellow rails (2-7 pairs

annually) is known to occur on Big Marsh outside the project area on the Crescent Ranger District based on information gathered since 1997 (Popper 2004). NatureServe gives this species a state ranking of S1B – Critically Imperiled –Breeding. There is no marsh habitat present in the Rim-Paunina project area and therefore implementation of any alternative would have **"No Impact"** on the yellow rail.

**North American Wolverine -** In December 2010 the North American wolverine in the contiguous United States was determined by the USFWS to be a distinct population and warranted to be listed but precluded by higher priority actions. The North American wolverine was added to their list of candidate species (Federal Register/Vol. 75, No. 239/Tuesday December 14, 2010, pp. 78030-78061) threatened primarily by loss of habitat due to the impact of climate change on their alpine habitats. The North American wolverine was also designated a Management Indicator Species for the Deschutes National Forest (USDA 1990). NatureServe (2011) gives them a state ranking of S1 – Critically Imperiled.

The wolverine is the largest terrestrial member of the mustelid family with males weighing 26 to 40 pounds and females 17 to 26 pounds. Wolverines are opportunistic feeders consuming a variety of foods depending on availability. Primarily a scavenger rather than a hunter, the wolverine forages where carrion can be found (Ruggiero 1994). In addition to carrion they will also prey on small animals and birds and eat fruits, berries, and insects. Wolverines occupy a wide variety of habitats from the arctic tundra to coniferous forest. The most common habitats are those that contain a high diversity of microhabitats and high prey populations. Copeland (2007) described wolverine habitat in the contiguous United States as consisting of small, isolated "islands" of high-elevation, alpine habitats containing sufficient snow depth during the denning period, separated from each other by low valleys of unsuitable habitats. Wolverines occupy habitat in a high elevation band from 6,888 feet to 8,528 feet in the mountains of the lower 48 states (Federal Register/ Vol. 73, No. 48/ Tuesday, March 11, 2008). The intervening valleys in this area range from 3,198 feet to 4,920 feet and are unsuitable for long-term wolverine habitat because they do not have the snow conditions or other habitat features required by wolverines (Aubry et al. 2007 in Federal Register/ Vol. 73, No. 48/ Tuesday, March 11, 2008). High elevation alpine wilderness areas appear to be preferred in summer, which tend to effectively separate most wolverine and human interactions. Aubry et al. (2007) reported that virtually all of the wolverine records located in the Pacific states were within or near alpine areas. The essential component of wolverine habitat may be isolation and the total absence of disturbance by humans (Ruggiero 1994). However, Copeland et al. (2007) reported unmaintained winter roads used for snowmobile access to trapping sites in the study area were frequently used for travel by wolverines.

The most critical and limiting habitat for wolverines seems to be acceptable natal denning habitat. Magoun and Copeland (1998) described two types of dens used by wolverines: natal and maternal. Natal dens are used during parturition[17] and occur more commonly in subalpine cirque basins associated with boulder talus slopes. Maternal dens are used subsequent to natal dens and before weaning occurs. They consist of a complex of dens associated with boulders or fallen trees. Magoun and Copeland (1998) believe that a critical feature of wolverine denning habitat is the dependability of deep snow to persist through the denning period of February through May with at least one meter of snow depth.

Home ranges for adult wolverines tend to be large ranging from 38.5 square miles to 348 square miles (Banci 1994 in Federal Register Doc. 03-26475). Copeland (1996) radio collared wolverines in Idaho and reported annual home ranges of resident adult females averaged 148 square miles and an average of 588 square miles for resident adult males. Aubry et al. (2007) compiled verifiable and documented records of wolverine occurrences and suggest that the historical distribution of wolverines in the Cascade Mountains and Sierra Nevada was disjunct, contradicting previous interpretations. Current records (1995-2005) are limited to north-central Washington, northern and central Idaho, western Montana, and northwestern

[17] The action or process of giving birth. Merriam-Webster 2012

Wyoming (Aubry et al. 2007). A recent observation with photographs indicates wolverines are still present in California (Zielinski, pers. comm. 2008). Aubrey et al. (2007) found no current records in Oregon despite concerted efforts to obtain verifiable evidence of wolverine occurrence using remote cameras, bait stations, and helicopter surveys in many areas of the Pacific states. However, five verifiable records of wolverine presence in Oregon were documented from 1961 to 1994 (Aubry et al. 2007). In the late winter early spring of 2011, researchers confirmed the presence of three wolverines using trail cameras and tracks in the Wallowa-Whitman National Forest Eagle Cap Wilderness of northeastern Oregon (ODFW Report 2011).

Wolverine denning habitat for the Deschutes National Forest was modeled using alpine dry, alpine meadow, glacier and rock talus lands with aspects of 320-120 degrees and clipped to areas above 5500 feet. A total of 1664 acres were mapped, generally in small, disjunct areas extending from Tolo Mountain at the south end of the Crescent District northward including areas on Cowhorn Mountain, Diamond Peak, Paulina Peak, Broken Top, South Sister, Middle Sister, North Sister, Black Crater, Mt. Washington, Three Finger Jack, and Mt. Jefferson. While the Rim-Paunina planning area contains some high elevation lands to 7,063 feet at the top of Walker Rim, it is not defined as alpine or subalpine habitat nor does it have talus slopes. Aubry et al. (2007) reported that virtually all of the wolverine records located in the Pacific states were within or near alpine areas. While there is potential for wolverines to travel through the area it is unlikely due to more remote habitats available along the crest of the Cascade Mountains. Implementation of the Rim-Paunina project would have **"No Impact**" to the North American wolverine and would not contribute to a negative trend in viability on the Deschutes National Forest.

**Pygmy Rabbit -** Pygmy rabbits typically occur in dense stands of big sagebrush growing in deep loose soils and NatureServe (2011) gives them a state ranking of S2 – 'Imperiled.' This habitat type does not occur within the project area. The selection and implementation of any alternative would have **"No Impact"** on the pygmy rabbit.

**Townsend's Big-Eared Bat -** This bat species typically utilizes caves and mine tunnels for its maternity and hibernation colonies. They roost almost exclusively in cavities, both in human-made structures (buildings, bridges, and mines) and caves (Christy and West 1993). They are extremely sensitive to disturbance while roosting, because they hang directly from the ceiling of the roost and do not go into torpor (temporary hibernation) during the day in summer colonies (Barbour and Davis 1969 and Dalquist 1948 cited in Christy and West 1993). Perkins and Levesque (1987) estimated the Oregon population at 2,300-2,600 bats and Gaines (1997 cited in NatureServe 2008) estimated 3,000-5,000 individuals in Oregon. The species range extends from southwestern British Columbia, western Washington, western and central Oregon, and northwestern and west-central California. NatureServe (2011) gives them a status of S2, 'Imperiled' in the state of Oregon. The greatest threat to the species is vandalism and disturbance by humans. Disturbance of a nursery colony or a hibernating group is likely to cause the bats to abandon the site and move to an alternate roost. An additional threat is blockage of cave/mine entrances through collapse or human activities (NatureServe 2009).

There are no known caves or mines on the Crescent Ranger District (L. Hickerson, pers. comm. 2008) and there are no documented reports of Townsend's big-eared bats occurring on the district. The selection and implementation of any alternative would have **"No Impact"** on the Townsend's big-eared bat and would not contribute to a negative trend in viability on the Deschutes National Forest.

**Silver-Bordered Fritillary** – This butterfly has a holarctic range extending from northern Canada southward into the United States and as far south as New Mexico (NatureServe 2008). While the species is common and widespread in northeastern Washington and northern Idaho, colonies are extremely local and isolated southward, and are particularly vulnerable to local extinctions. Only two primary colonies are found in Oregon; one at Big Summit Prairie on the Ochoco National Forest and one in the Strawberry

Mountains Wilderness on the Malheur National Forest (Miller and Hammond 2007). Suitable habitat for this species is described as mostly wet meadows, marshes, bogs, and more open parts of shrubbier wetlands (NatureServe 2011, Miller and Hammond 2007). This species is dependent on the maintenance of open and wet meadow habitats (Miller and Hammond 2007). Food sources for the adults include nectar sources such as composite flowers, including goldenrod and black-eyed susans (Opler et al. 2006). Eggs are laid singly near host plants and caterpillar hosts are violets including *Viola glabella* and *Viola nephrophylla* (Opler et al. 2006). NatureServe (2011) lists the Oregon state ranking as S2-'Imperiled.' Limited wet meadow habitat is present in the Five Mile Draw drainage near Rim-Paunina Unit 20 and east of the Two Rivers North subdivision near Unit 205. No treatments would occur in the wet meadows therefore, the selection and implementation of any alternative would have **"No Impact"** to the silver-bordered fritillary.

**Northern Bald Eagle (*Haliaeetus luecocephalus), R6 Sensitive, Management Indicator Species***

The northern bald eagle was officially de-listed as a federal threatened species on August 8, 2007. The Federal Register (Vol. 72, No. 130/Monday July 30, 2007) stated the bald eagle has made a dramatic resurgence from the brink of extinction. The banning of DDT, coupled with cooperative conservation efforts of the Service, States, other Federal agencies, non-government organizations, and individuals, have all contributed to the recovery of our National symbol. While the bald eagle has been de-listed they are still protected under the Bald and Golden Eagle Protection Act of 1940. This law provides for the protection of bald eagles and the golden eagle by prohibiting the take, possession, sale, purchase, barter, offer to sell, transport, export or import, of any bald or golden eagle, dead or alive, including any part, nest, or egg, unless allowed by permit (16 U.S.C. 668(a); 50 CFR 22). The U.S. Fish and Wildlife Service (2007) has prepared Bald Eagle Management Guidelines to help landowners, land managers, and others to meet the intent of this Act. In addition, monitoring of selected bald eagle nest sites would continue to occur including sites on national forest system lands.

The northern bald eagle was selected as a management indicator species for the Deschutes National Forest. Certain river or lake locations on the Forest are extremely important as feeding sites during the reproductive, fall and winter periods. Most bald eagles are sensitive to human disturbance during these time periods. Over-mature ponderosa pine or mixed conifer forest is preferentially selected for nesting or winter-roosting habitat. The Deschutes National Forest Land and Resource Management Plan (LRMP) also provides direction for the management of habitat through the designation of Bald Eagle Management Areas (BEMAs). Management direction in the LRMP for BEMAs permits pre-commercial thinning and timber harvest to achieve eagle habitat objectives. In catastrophic situations, all efforts are to be made to protect or create suitable eagle habitat (Deschutes LRMP M3-4, 5, 6, 7 page 4-94). It also calls for protection of all existing nest, roost, and perch trees which are defined as 110 feet in height and 40 inches or greater in diameter (Deschutes LRMP M3-11, 12, page 4-95). The DLRMP (4-19) states the target bald eagle population is 35-45 pairs. The current population level is 49 pair territories on the Deschutes National Forest which exceeds the target level (Programmatic BA, USDA 2010).

**Ecology** -A detailed account of bald eagle habitat requirements can be found in the Pacific Bald Eagle Recovery Plan (USDI 1986). Bald eagle nesting territories are normally associated with lakes, reservoirs, or rivers. Nests are usually located in large conifers in uneven-aged, multi-storied stands with old-growth components (Anthony et al. 1982). Nest trees usually provide an unobstructed view of the associated body of water. Live, mature trees with deformed tops are often selected for nesting. East of the Cascade Mountains in Oregon, bald eagles prefer nesting in ponderosa pine trees that average 46 inches in diameter (range 21-76 inches) and tend to be larger than the surrounding trees (Anthony et al. 1982).

**Existing Condition** -There are currently 17 bald eagle nesting territories on the Crescent Ranger District located adjacent to Odell Lake, Crescent Lake, Davis Lake, and the Crescent District side of Wickiup Reservoir. There are no bald eagle nests, roosts, nor any designated Bald Eagle Management Areas

(BEMAs) within the Rim-Paunina project area. The nearest BEMA is located approximately ten miles to the northwest of the project area on the east side of Crescent Lake. Wildlife observational records list only one incidental observation of a bald eagle in the project area. The lack of records would be consistent with the lack of large water bodies with a food base capable of supporting a nesting pair.

### *Environmental Consequences*

**Effects Common to All Alternatives and Determination**

Because there are no bald eagle nests, roosts, or BEMAs within the Rim-Paunina project area, the selection of any alternative would no direct, indirect, or cumulative effects to bald eagles. The combination of actions proposed for Rim-Paunina would result in a determination of **"No Impact"** to the bald eagle and consequently have no cumulative effects. Project implementation would also not contribute to a negative trend in viability for the bald eagle on the Deschutes National Forest.

**Lewis' Woodpecker (*Melanerpes lewis*), R6 Sensitive, Management Indicator Species**

**Ecology:** The Lewis' woodpecker is a medium-sized bird that relies on flycatching during the spring and summer and stored mast and fruits in the fall (Marshall et al. 2003). It breeds in low numbers in open habitats along eastern Oregon rivers and stream valleys including the lower Deschutes River. The species is most common in open habitats (e.g. burns) in and near Cascade forests. Wisdom (2000) reported that burned ponderosa pine forest created by stand-replacing fires provide highly productive habitats as compared to unburned pine. Lewis' are aerial insectivores and Linder and Anderson (1998) suggested the main priorities for habitat use are perch availability, open canopy and a brushy understory. They winter in oak savannah habitats (Marshall et al. 2003) and the nearest wintering areas to the Rim-Paunina project would be located in southwest Oregon near Medford and Roseburg. Lewis' Woodpeckers are not considered strong cavity excavators but require large snags in an advanced stage of decay that are easier to excavate. Lewis' woodpeckers would also use old cavities created by other woodpeckers. Forty-two percent of the nest trees on the eastern edge of the Mt. Hood National Forest were in ponderosa pine (typically snags) and 43 percent were in living and declining Oregon white oak. The mean diameter of nest trees was 26 inches and mean nest tree height was 41 feet (Marshall et al. 2003). Haggard and Gaines (2001) determined that the Lewis' woodpecker was most abundant in low snag density stands within a stand replacement fire study conducted on the Wenatchee National Forest in Washington. Marshall et al. (2003) reports the species is declining throughout its range possibly due to loss of suitable habitat, competition for nest holes, and the effects of pesticides. NatureServe lists the Oregon state ranking as S2S3B – 'Imperiled/Vulnerable Breeding.'

The Viable Ecosystem model was used to map suitable nesting habitat defined as open forested stands with less than 40 percent canopy in the dry ponderosa pine PAGs with trees equal to or greater than 15-20 inch diameter. There is an estimated 1,041 acres of mostly consolidated nesting habitat on National Forest System lands in the extreme southeast corner of the planning area. This figure accounts for all past and present timber sales, natural events such as wildfires, and any other habitat altering activity including the construction of roads over the last four to five decades. The number of acres of habitat in the analysis area is primarily due to most ponderosa pine stands being densely stocked and not providing the more open forest this species prefers for nesting. Habitat acreage is likely on an increasing trend over the last decade or two as commercial and small-diameter tree cutting has reduced tree density and combined with prescribed underburning to lower canopy cover levels. Existing district wildlife sighting records show two observations of Lewis' woodpeckers in or adjacent to the project area with one on Walker Rim and the other on the Gilchrist State Forest near the Deschutes National Forest boundary east of Highway 97. Outside the project area nesting Lewis' woodpeckers have been confirmed within the 21,000 acre Davis Fire area east of Davis Lake and near Wickiup Reservoir on the Crescent District.

### *Environmental Consequences*

**Alternative A –No Action**

As shown in Table 29 the selection of this alternative would result in a reduction of nesting habitat from a current 1,041 acres to a projected 632 acres in 2018 and additional decrease to 334 acres by 2058. This is the result of no silvicultural or fuels treatments to reduce tree stem density and canopy cover in ponderosa pine stands to less than 40 percent defined as nesting habitat. The lack of treatments would directly correlate into reduced Lewis' woodpecker presence in the planning area. If large-scale disturbance events occurred such as wildfire, beetle outbreaks, or tree diseases, the negative impacts could be reversed depending on scale within the ponderosa pine plant associations.

Table 29 displays projected modeling of Lewis' woodpecker nesting habitat in the planning area by alternative for years 2018 and 2058. The year 2018 represents the expected completion of all actions associated with the Rim-Paunina project and 2058 represents vegetation and habitat changes 40 years after Rim-Paunina implementation assuming no further treatments are conducted in the planning area.

**Table 29. Acres and Percentage of Projected Lewis' Woodpecker Nesting Habitat in the Planning Area Post Harvest (2018) and Projected For Year 2058 Expressed in Acres and as a Percentage (1,041 Acres Currently Suitable or 3 Percent of the Planning Area)**

| Modeled Year | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
|---|---|---|---|---|---|
| **2018** | 632 (2%) | 1,309 (3%) | 1,241 (3%) | 1,182 (3%) | 1,281 (3%) |
| **2058** | 334 (1%) | 1,211 (3%) | 1,131 (3%) | 1,090 (3%) | 1,244 (4%) |

**Effects Common to All Action Alternatives (B, C, D, and E)**

All action alternatives would include a combination of commercial thinning harvests and small tree thinning less than eight inches in diameter. Fuel treatments including prescribed underburning would also occur within ponderosa pine stands with burning taking place in the spring or fall months depending on appropriate weather conditions. The combination of actions would have the capability to increase nesting habitat suitability by reducing canopy cover in the ponderosa pine dominated stands below the 40 percent level modeled as suitable nesting habitat. In addition, thinning treatments would accelerate the diameter growth of smaller ponderosa pine into trees and future snags into the size class this species appear to require having benefits well into the future.

While there are differences in the amount of acreage proposed for thinning and burning, each action alternative results in an increasing amount of nesting habitat in the planning area as shown in Table 29. The modeling also showed the action alternatives are very similar to each other in nesting acreage with less than 154 acres difference between the action alternatives for years 2018 and 2058. Viable modeling indicates by 2018 when the Rim-Paunina project is expected to be completed, all action alternatives show almost double the amount of nesting habitat compared to Alternative A. For the year 2058 modeling shows all action alternatives would more than triple nesting habitat acreage for Lewis' woodpeckers compared to 2058 with the no action alternative. This is a result of the proposed treatments and to a minor degree some stands that have grown into suitability by the year 2058. The table also shows a small reduction in suitable nesting acreage in for each alternative from 2018 to 2058. This is the result of increasing tree growth and canopy cover exceeding 40 percent in forested stands across the planning area, though nesting acreage is greater than the no action alternative. All modeling assumes no further treatments would occur in the planning area until 2058.

Prescribed underburning proposed ranges from 8,506 acres (Alternative B), 12,762 acres (Alternatives C and D) and 13,491 acres (Alternative E). The burning would reduce shrub density and its distribution within each unit, affecting the Lewis' woodpecker which is positively associated with a brushy shrub understory for insect production. It is also expected that maintenance burns would occur on the same acreage on an 8-15 year rotation. A minimum 15 percent of each treatment unit would remain unburned

in a mosaic pattern providing shrub cover of bitterbrush, ceanothus, and manzanita for insect production. Because Alternative B proposes the least amount of prescribed burning it would provide the greatest nesting habitat benefit of the four action alternatives. This is the result of increased retention of shrub cover though all action alternatives would have greater benefits than the no action alternative.

While harvest operations associated with timber sales may require limited snag felling for safety considerations during temporary road construction and placement of log landings, overall snag removal would be very minimal based on past timber sales and temporary road building projects. Project Design Features have been incorporated to limit snag felling and the loss of snags during prescribed burning operations. This strategy would be consistent with the recommendations in the Landbird Conservation Strategies for the East-Slope Cascades (Altman 2000) for the retention of greater than one ponderosa pine snag per acre greater than 40 feet tall and 30 inches in diameter and an open overstory with a mean canopy cover less than 40 percent in those areas where this size snag is present. While timber harvest and spring underburning have the potential to disrupt nesting pairs of Lewis' woodpeckers this is considered a short-term impact (1-3 years) and only where activities would occur during the spring nesting season. Because not all of expected activities would occur at the same time over the entire project area, undisturbed nesting habitat would be still be available for the species across suitable nesting habitat in the project area.

**Determination**

Timber harvest and prescribed underburning if conducted in the spring may result in limited disturbance to individuals or nesting pairs and a reduction in shrub cover. However, with mitigation measures in place for snag retention and unthinned/unburned patches with native shrubs left intact in each treatment unit, over the short- and long-term each action alternative is projected to result in a substantial increase in nesting habitat in the Rim-Paunina planning area. Therefore, project implementation of Alternative B, C, D, or E would result in a determination of **"Beneficial Impact"** to the Lewis' woodpecker. Because there is an improving habitat trend in the Little Walker watershed when added to the 141,773 acres of nesting habitat on the Deschutes National Forest, there is also an increasing viability trend for the Lewis' woodpecker.

**Cumulative Effects**

Table 19 was reviewed for projects that overlap in time and space and have the same zone of influence. The zone of influence was defined as the 40,000 acre Rim-Paunina project area because of the species relatively small home range. There are approximately 106 acres of private land in the planning area although it unlikely to provide habitat for this species because the acreage is within a rural housing subdivision and the large diameter trees needed by Lewis' woodpeckers are not present. There are no projects that overlap with the Rim-Paunina planning area, therefore no potential for additive cumulative effects.

**White-Headed Woodpecker (*Picoides albolarvatus*), R6 Sensitive, Management Indicator Species**

**Ecology -** The white-headed woodpecker is a medium sized bird and unique because of striking plumage with a mostly white head with males having a red patch on the nape. They are a resident of montane forests from southern interior British Columbia south through central Washington, northern Idaho, east and southwest Oregon, north and central California, and the eastern edge of central Nevada to the mountains of southern California (Marshall et al. 2003). The presence of old growth pine is thought to be important to white-headed woodpeckers. Larger diameter ponderosa and sugar pine trees provide bark crevices for the invertebrate prey of white-headed woodpeckers and are also good cone producers. During the winter months white-headed woodpeckers rely on seeds from ponderosa pine and sugar pine. Old-growth stands also have greater densities of the large-diameter snags that white-headed woodpeckers appear to select for nesting (Frenzel 2002). He also reported that the presence of sugar pine may be important at high elevation sites as an alternate food source. They usually excavate nest cavities in snags,

but other recorded substrates include stumps, leaning logs, and the dead tops of live trees. Frenzel's study area on the Deschutes and Winema National Forests (2002) determined that nest trees ranged from 23.6 to 118.1 cm (9-46 inches) with an average diameter of 27 inches and 89 percent of the nest trees were in ponderosa pine. He also measured canopy closure at the nest tree which ranged from 0 percent to 57 percent with a mean of 13 percent.

Frenzel (2002) concluded population recruitment for this woodpecker was insufficient to offset mortality in his study areas on the Deschutes and Winema National Forests. He also reported that shrub growth and increased understory tree densities from fire suppression may be factors affecting levels of mammalian nest predation and vulnerability of adults to avian predation. Marshall et al. (2003) stated the long-term stability of this woodpecker in Oregon and Washington appears to rest with reversing the declining health of ponderosa pine forest. NatureServe (2011) lists the Oregon state ranking as S2S3 – 'Imperiled/Vulnerable.'

The Viable Ecosystem model estimated there are approximately 1,090 acres of ponderosa pine, white fir, and Shasta red fir plant associations with the presence of ponderosa pine greater than 20 inch diameter with an open canopy condition defined as suitable nesting habitat for this species. This figure accounts for all past and present timber sales, natural events such as wildfires, and any other habitat altering activity including the construction of roads to access forested stands over the last four to five decades. The suitable nesting habitat in the project area is located on National Forest System lands in the very southeastern portion east of Highway 97 near the base of Walker Rim and closely overlaps with Lewis' woodpecker habitat. Smaller patches of white-headed woodpecker habitat are also present at the far southwestern end of the planning area one to two miles south of the Two Rivers North housing subdivision. Suitable nesting habitat in the project area is likely on an increasing trend over the last fifteen years due to commercial and small-diameter tree cutting to reduce tree density and combined with prescribed underburning. These actions have lowered overall canopy cover closer to what the species prefers and also reduced the amount of bitterbrush and small diameter down wood in ponderosa pine stands for small mammals that prey on white-headed woodpecker nestlings. District records do not show any known white-headed woodpecker nests but do include nine observations of white-headed woodpeckers between the base of Walker Rim and Highway 97. Figure 6 shows modeled white-headed woodpecker nesting habitat using green tree data from Viable and where snags greater than 20 inches diameter exceed 0.5 snags/acre (30% tolerance interval from DecAID).

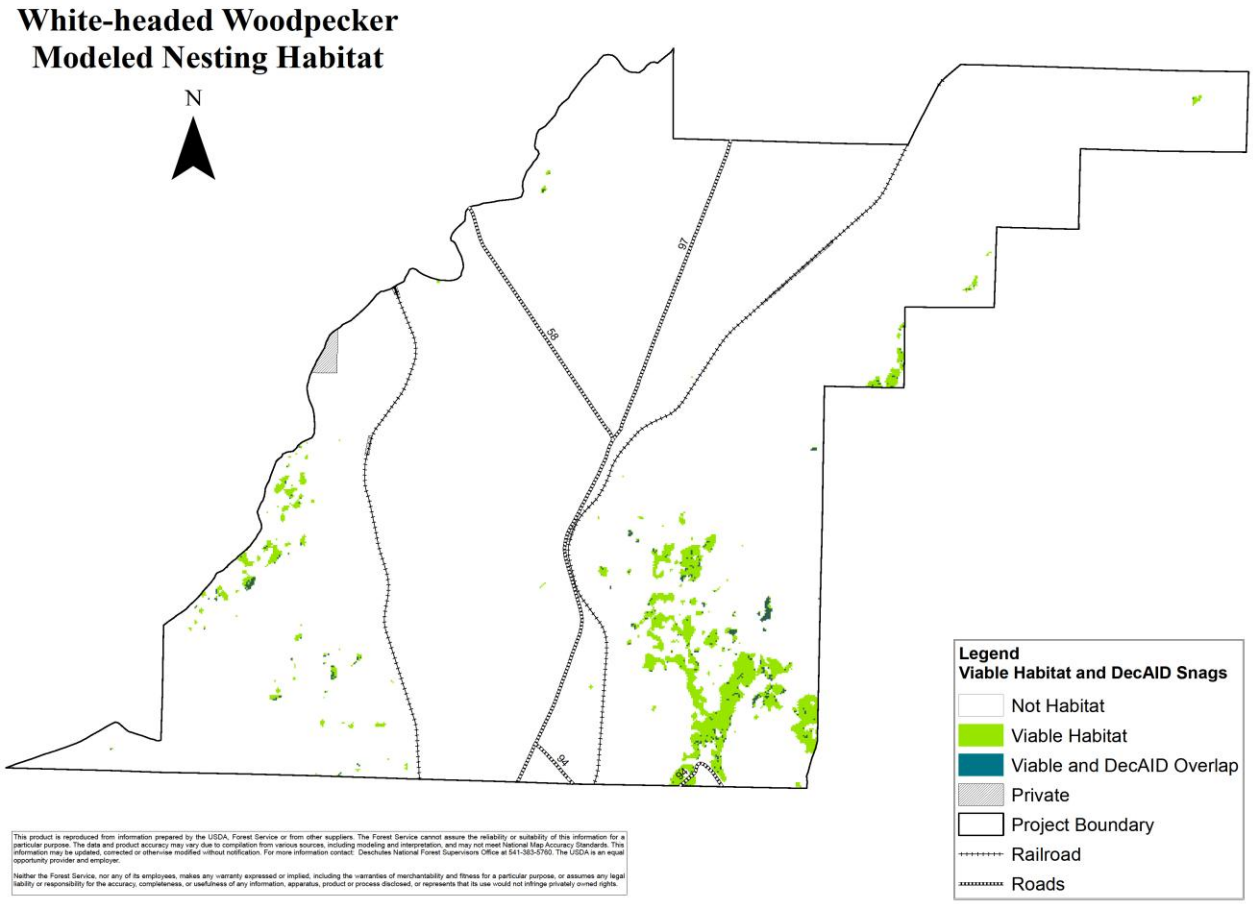



**Figure 6. White-headed Woodpecker Nesting Habitat Modeled using Green Tree Data (Viable) that Overlaps with DecAID Snag Data**

Table 30. displays the range of tolerance intervals based on snag levels taken from DecAID. At the zero percent tolerance interval, 408 acres (37%) percent of the 1,090 acres of modeled current nesting habitat do not have any snags greater than 20 inches dbh. At the 0-30 percent tolerance interval, 574 acres (53%) are showing snag densities that meet or exceed 0.5 snags/acre greater than 20 inches dbh. At the 30-50 percent tolerance interval, only 68 acres are showing snag densities that meet or exceed 0.5-1.8 snags/acre greater than 20 inches dbh. For the greater than 50-80 percent and 80+ percent levels, there are only 40 acres modeled as having enough snags greater than 20 inches dbh (1.8-3.8 snags/acre for 50-80% and greater than 3.8 snags/acre for 80+%) capable of supporting a higher proportion of the population. However, as previously mentioned, white-headed woodpeckers are known to use stumps, leaning logs, and dead portions of live trees (dead tops, dead limbs, etc.) as nesting substrate in addition to snag habitat. Project Design Features in Chapter 2 disclose the limited circumstances where snag felling may occur. Prescribed burn plans developed after timber harvest activities are completed may include a request to create additional snags from burning where snags are currently limited.

**Table 30. Tolerance Intervals for the White-headed Woodpeckers**

| White-headed Woodpecker 1,090 Acres | | Density of Snags ≥ 20" dbh by tolerance interval | | | | |
|---|---|---|---|---|---|---|
| Tolerance Interval | | 0% | 0-30% | 30-50% | 50-80% | 80%+ |
| Density (#/hectare) | | 0 | 0-1.2 | 1.2-4.5 | 4.5-9.4 | 9.4+ |
| Density (#/acre) | | 0 | 0.5 | 0.5-1.8 | 1.8-3.8 | 3.8+ |
| % of Habitat | | 37% | 53% | 6% | 3% | 0% |
| Acres | | 408 | 574 | 68 | 38 | 2 |

### *Environmental Consequences*

**Alternative A –No Action**

Viable habitat modeling conducted for this alternative as shown in Table 31 displays a steady depletion of white-headed woodpecker nesting habitat in the planning area from the present to the 2018 and 2058 time periods. The year 2018 was selected for modeling purposes to represent when any action alternative would be fully implemented and 2058 to represent 40 years post-harvest. The depletion of nesting habitat is the result of no tree cutting and/or underburning to reduce tree densities and canopy cover below 40 percent modeled as nesting habitat. This would result in reduced white-headed woodpecker presence in the planning area and reduced annual population recruitment because nest predation would likely increase in the absence of prescribed burning to control shrub growth. Increased white-headed woodpecker predation by raptors is also likely because increasing tree densities would limit the woodpeckers' ability to see raptors from greater distances. If large-scale disturbance events occurred such as wildfire, beetle outbreaks or tree diseases, the negative impacts could be reversed depending on scale within the ponderosa pine plant associations.

Table 31 displays projected modeling of white-headed woodpecker nesting habitat in the planning area by alternative for years 2018 and 2058. The year 2018 represents the expected completion of all actions associated with the Rim-Paunina project and 2058 represents vegetation and habitat changes 40 years after implementation. Modeling also assumes no further treatments are conducted in the planning area through 2058.

**Table 31. Acres and Percentage of Projected White-Headed Woodpecker Nesting Habitat in the Planning Area Post Harvest (2018) and Projected for Year 2058 Expressed in Acres and as a Percentage (1,090 Acres Currently Suitable or 3 Percent of the Planning Area)**

| Modeled Year | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
|---|---|---|---|---|---|
| **2018** | 786 (2%) | 1,643 (4%) | 1,565 (4%) | 1,487 (4%) | 1,700 (4%) |
| **2058** | 424 (1%) | 1,803 (5%) | 1,697 (4%) | 1,602 (4%) | 1,745 (4%) |

**Effects Common to All Action Alternatives (B, C, D, and E)**

All action alternatives would conduct a combination of commercial thinning harvests and small diameter thinning less than eight inches in diameter, reducing canopy cover in the ponderosa pine dominated stands below the 40 percent level modeled as suitable nesting habitat. In addition, thinning treatments would accelerate the diameter growth of smaller ponderosa pine into trees and future snags of the size class this species appears to require, having benefits well into the future. The planned fuels treatments with prescribed underburning would likely occur in the spring or fall months depending on appropriate weather conditions. It is also expected that maintenance burns would occur on the same acreage on an 8-15 year rotation. The burning would help reduce small tree and shrub density within each treatment unit benefitting white-headed woodpeckers by increasing their sight distance of avian predators. It would

reduce the amount of shrubs and small diameter wood that provides habitat for small mammals such as ground squirrels and chipmunks known to predate on white-headed woodpecker nestlings. As shown in Table 31, this combination of activities would have the capability to improve existing nesting habitat in the short- and long-term (years 2018 and 2058) compared to Alternative A though the differences between action alternatives are less than several hundred acres for both 2018 and 2058.

Project Design Features have been incorporated into the project for the protection of existing snags during timber harvest operations and prescribed underburning treatments although some very limited snag felling may be required for safety considerations in the placement of temporary roads and log landings. This design feature would be consistent with the recommendations by Altman (2000) in the Landbird Conservation Strategies for the East-Slope Cascades and white-headed woodpeckers that ponderosa pine stands have at least ten trees per acre, at least 21 inch diameter, of which two should be greater than 31 inches. There should also be at least 1.4 snags per acre, at least eight inches in diameter, with 50 percent having decay and an overall mean canopy closure of 10-40 percent.

Timber harvest and spring underburning have the potential to disrupt nesting pairs of white-headed woodpeckers. This is considered a short-term impact (1-3 years) and only where activities would occur during the spring nesting season. Because not all of expected activities would occur at the same time over the entire project area, undisturbed nesting habitat would be still be available for the species across suitable nesting habitat in the project area.

**Alternative B**
**Direct and Indirect Effects**
As shown in Table 31, modeling for Alternative B indicates this alternative would result in the second highest amount of white-headed woodpecker nesting habitat by 2018 and the highest amount as projected out to 2058. This is due to the amount of commercial thinning and prescribed underburning planned within ponderosa pine dominated stands that maintain canopy cover below the modeled 40 percent level defined as nesting habitat. Planned small diameter thinning to accelerate tree growth and reduce stand density would also result in increasing nesting habitat by 2058 and has been incorporated into the nesting acres displayed in Table 31. .

**Determination**
Nesting habitat is projected to more than double by 2018 and quadruple by 2058 compared to the no action alternative. Therefore, the combination of short- and long-term habitat improvement would result in a determination of “Beneficial Impact” for the white-headed woodpecker. Because there is an improving habitat trend in the Little Walker watershed when added to the 198,330 acres of nesting habitat on the Deschutes National Forest, there is also an increasing viability trend for the white-headed woodpecker.

**Alternative C**
**Direct and Indirect Effects**
As shown in Table 31, modeling for Alternative C indicates this alternative would result in the third highest amount of white-headed woodpecker nesting habitat for 2018 and 2058 of the four action alternatives. Similar to Alternative B, this is due to the amount of commercial thinning and prescribed underburning planned within ponderosa pine dominated stands that maintain canopy cover below the modeled 40 percent level defined as nesting habitat. Planned small diameter thinning to accelerate tree growth and reduce stand density would also result in increasing nesting habitat by 2058 and has been incorporated into the nesting acres displayed in Table 31.

**Determination**
Nesting habitat is projected to almost double by 2018 and quadruples by 2058 compared to the no action alternative. Therefore, the combination of short- and long-term habitat improvement would result in a determination of "Beneficial Impact" for the white-headed woodpecker. Because there is an improving habitat rend in the Little Walker watershed when added to the 198,330 acres of nesting habitat on the Deschutes National Forest, there is also an increasing viability trend for the white-headed woodpecker.

**Alternative D**
**Direct and Indirect Effects**
As shown in Table 31, modeling for Alternative D indicates this alternative would result in the fewest acres of white-headed woodpecker nesting habitat projected for 2018 and 2058 of the four action alternatives. Similar to Alternative B, this is due to the amount of commercial thinning and prescribed underburning planned within ponderosa pine dominated stands that maintain canopy cover below the modeled 40 percent level defined as nesting habitat. Planned small diameter thinning to accelerate tree growth and reduce stand density would also result in increasing nesting habitat by 2058 and has been incorporated into the nesting acres displayed in Table 31. The planned 778 acres of group selection cuts in heavy mistletoe infected stands also contribute to the reduced increase in nesting habitat for the white-headed woodpecker for both 2018 and 2058.

**Determination**
In spite of having the fewest acres of nesting acres projected for 2018 and 2058, there would still be an increase of 701 acres of nesting habitat (89 percent increase from the current level) by 2018 and an almost quadrupling of nesting acreage by 2058 as compared to the no-action alternative. Therefore, the combination of short- and long-term habitat improvement would result in a determination of "Beneficial Impact" for the white-headed woodpecker. Because there is an improving habitat trend in the Little Walker watershed when added to the 198,330 acres of nesting habitat on the Deschutes National Forest, there is also an increasing viability trend for the white-headed woodpecker.

**Alternative E**
**Direct and Indirect Effects**
As shown in Table 31, modeling for Alternative E indicates this alternative would result in the highest amount of white-headed woodpecker nesting habitat by 2018 and the second highest amount modeled for 2058. This is due to the amount of commercial thinning and prescribed underburning planned within ponderosa pine dominated stands that maintain canopy cover below the modeled 40 percent level defined as nesting habitat. Planned small diameter thinning to accelerate tree growth and reduce stand density would also result in increasing nesting habitat by 2058 and has been incorporated into the nesting acres displayed in Table 31.

**Determination**
Because Alternative E proposes the greatest amount of treatments it would also provide the greatest benefit to the species, though all four alternatives would result in a vast improvement in suitable nesting habitat compared to the no action alternative. Nesting habitat is projected to more than double by 2018 and quadruple by 2058 compared to the No Action Alternative. Therefore, the combination of short- and long-term habitat improvement would result in a determination of "Beneficial Impact" for the white-headed woodpecker. Because there is an improving habitat rend in the Little Walker watershed when added to the 198,330 acres of nesting habitat on the Deschutes National Forest, there is also an increasing viability trend for the white-headed woodpecker.

**Cumulative Effects**
Table 19 was reviewed for projects that overlap in time and space with the same zone of influence as Rim-Paunina. The zone of influence was defined as the 40,000 acre Rim-Paunina project area because of

the species relatively small home range. There are approximately 106 acres of private land in the planning area although it unlikely to provide habitat for this species because the acreage is within a rural housing subdivision and the large diameter trees needed by white-headed woodpeckers are not present. There are no projects that overlap with the Rim-Paunina planning area, therefore no potential for additive cumulative effects.

**Crater Lake Tightcoil (*Pristiloma articum crateris*), R6 Sensitive**

**Ecology -** "The Crater Lake tightcoil may be found in perennially wet situations in mature conifer forests, among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 meters of open water in wetlands, springs, seeps, and riparian areas, generally in areas which remain under snow for long periods of time during the winter. Riparian habitats in the eastern Oregon Cascades may be limited to the extent of permanent surface moisture, which is often less than 10 meters from open water" (Duncan et al. 2003). Threats to the species include activities that compact soils, reduce litter and/or vegetative cover, or impact potential food sources. NatureServe lists the Oregon status of the Crater Lake tightcoil as S1-Critically Imperiled.

**Existing Condition -** Due to the well draining pumice soils on the Crescent Ranger District, areas that retain permanent surface moisture are limited to very narrow margins along the edge of springs, seeps, or streams. As of October, 2011, there is only one confirmed Crater Lake tightcoil population on the Crescent District, located in 1999 near the confluence of Princess Creek and Odell Lake outside the Rim-Paunina project area. Perennially wet habitat in the Rim-Paunina project area is limited to several unnamed springs east of the Two Rivers North subdivision, several small ponds (<1/20 acre) in the Five Mile Draw drainage between Highways 58 and 97, a spring near Forest Road 9751 in the southern part of the project area and Boundary Springs in the very northeastern part of the project area. Surveys adjacent to these wetlands have not been conducted for the species.

### *Environmental Consequences*

**Effects Common to All Alternatives**

Project Design Features (see Chapter 2) prohibit the burning and tree cutting within the perennially wet areas of proposed treatment units. With this feature in place there would no disturbance of potential habitat. Therefore, the selection and implementation of any alternative would have **"No Impact"** to the Crater Lake tightcoil. Because there are no identified direct or indirect effects there would also be no cumulative effects.

**Johnson's Hairstreak (*Callophrys johnsoni*), R6 Sensitive**

**Ecology -** The Johnson's hairstreak butterfly is found from southwest British Columbia southward into the Coast Ranges to San Francisco in California; south in the Cascades and Sierra Nevada to Yosemite and also in the Blue Mountains of eastern Oregon. In Oregon its ranking is listed as S2, 'Imperiled', very rare, or local throughout its range or found locally in a restricted range (NatureServe 2011).

Suitable habitat for this species is described as coniferous forests, especially old growth (Opler et al. 2006) and old growth coniferous forests with red firs, western hemlocks, or gray pines on which its parasitic (mistletoe) hosts grows (NatureServe 2011). Johnson's hairstreak is believed to feed generally on all dwarf mistletoe species throughout its range, and to perhaps specialize on locally available dwarf mistletoes in specific localities (Miller per comm. 2008 cited by Schmitt and Spiegel 2008). Miller and Hammond (2007) describe suitable habitat as almost identical to the northern spotted owl except the butterfly does not occur south of central California. The caterpillar food plant is western dwarf mistletoe. Adults find nectar on low growing plants such as whitethorn ceanothus and Mt. Hood Pussypaws (NatureServe 2011 and USDA, NRCS 2008). Miller and Hammond (2007) described management practices to benefit this species need to promote the maintenance of mature and old-growth conifers at middle to low elevations on the west slope of the Cascade Mountains and Coast Range.

Opler et al. (2006) shows Johnson's hairstreak documentation for western and central Oregon plus the Blue Mountains in northeastern Oregon. The species is suspected to occur on the Deschutes National Forest but currently there is no confirmed documentation. A survey protocol was released in April 2010 (Davis et al.) and formal surveys using the protocol were conducted on the Deschutes National Forest during the summer of 2010. Larvae were collected from dwarf mistletoe from the Crescent Ranger District; however, species identification determined the larvae were not Johnson hairstreak. Because the species is closely associated with dwarf mistletoe which is widespread in the planning area, the Johnson's hairstreak is assumed to occur. Schmitt and Spiegel (2008) state that claims of dwarf mistletoes occurring solely in old growth or are dependent upon old growth are erroneous. Dwarf mistletoes generally increase in incidence and intensity in older stands, although even young stands readily host dwarf mistletoes and maturing stands may be severely infected if they have been continually infected by a residual overstory. They also state that in the absence of recent large scale disturbance, dwarf mistletoe infestation levels can occur in early, mid, and late successional stands. Incidental observations within the 40,000 acre project indicate dwarf mistletoe is very common and infection is assumed to be present in all seral stage classes which could serve as a host for the caterpillar.

### *Environmental Consequences*

**Direct and Indirect Effects**

**Alternative A – No Action**

The selection of this alternative would result in no immediate effect to Johnson's hairstreak because no vegetation management actions would occur to reduce mistletoe infection. While this butterfly has yet to be confirmed on the Crescent District, potentially suitable habitat would be maintained based on the widespread presence of dwarf mistletoe in all plant associations across the 40,000 acre project area. Over decades, the older and largest diameter trees may eventually weaken from severe mistletoe infections and succumb to beetle attacks and/or drought. However, until the trees' death, the infection would continue to spread to the understory trees and perpetuate the life cycle of mistletoe while at the same time providing habitat for the Johnson's hairstreak.

**Effects Common to All Action Alternatives (B, C, D, and E)**

The selection of any action alternative would result in the commercial thinning, small diameter thinning, and prescribed underburning of forested stands that include trees infected with western dwarf mistletoe. These actions would reduce but not eradicate mistletoe presence in the 40,000 acre project area. Consequently, mistletoe infection would continue to exist within actively treated stands, as well as forested stands not selected for treatment. Similar mitigation measures for the retention of no-treatment areas and the incorporation of shrub retention patches within prescribed burn units would be applied for all action alternatives.

These actions would be consistent with recommendations from Miller and Hammond (2007) that promoting the maintenance of mature and old-growth conifer forests would benefit this species. Prescribed underburning would occur on ponderosa pine dominated stands and may result in the reduction of host plants such as ceanothus and pussypaws within burn units. Each prescribed burn is required to have a site-specific plan and Project Design Features listed in Chapter 2 would require the retention of unburned patches including acreage with shrubs and forbs. Monitoring has shown these requirements to be generally effective, given changing environmental conditions. Usually 30-40 percent of each burn unit's shrub cover would be left untreated for big game browse, nesting cover for birds, and as host plants for butterflies. These actions would continue to maintain the presence of mistletoe infection and host plants widely distributed across the entire 40,000 acre area.

**Alternative B**
**Direct and Indirect Effects**
A total of 12,036 acres are proposed for commercial thinning and non-commercial (small diameter) thinning in ponderosa pine and lodgepole pine stands. Within the thinning acreage, 8,506 acres would also have prescribed burns applied on ponderosa pine dominated stands. This alternative would have the least effect on mistletoe infected trees and potential Johnson's hairstreak butterfly habitat because it proposes the least amount of treatment acreage.

**Determination**
While mitigation measures and Project Design Features are in place for the retention of unburned patches of shrub habitat and 15-25 percent no harvest treatment acreage for each thinning unit, mistletoe infected trees and butterfly host plants would be removed through thinning and burning and could potentially be occupied by the butterflies or their larvae. However, because of the widespread occurrence of mistletoe within the project area, it is assumed species presence would still be maintained with this alternative. Based on these assumptions, the determination is **"May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species"** for the Johnson's hairstreak.

**Alternative C**
**Direct and Indirect Effects**
This alternative would conduct commercial and small diameter thinning on 9,792 acres plus prescribe brush mastication and underburning on an additional 3,780 acres, and thin small diameter trees, prune limbs, and apply prescribed burning on 1,205 acres for a total of 14,777 acres of treatments. The effects described in common for all action alternatives would apply although on greater acreage compared to Alternative B.

**Determination**
While mitigation measures and Project Design Features are in place for the retention of unburned patches of shrub habitat and 15-25 percent no harvest treatment acreage for each thinning unit, mistletoe infected trees and butterfly host plants would be removed through thinning and burning and could potentially be occupied by the butterflies or their larvae. However, because of the widespread occurrence of mistletoe within the project area, it is assumed species presence would still be maintained with this alternative. Based on these assumptions, the determination is **"May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species"** for the Johnson's hairstreak.

**Alternative D**
**Direct and Indirect Effects**
Implementation of this alternative uses the same units and would result in the same amount of acreage treated as Alternative C. The major difference is that Alternative D would place greater emphasis on treating the most heavily infected mistletoe stands of ponderosa pine. Within the 9,792 acres of commercial thinning and small diameter thinning proposed, approximately 800 acres of group selection cuts would occur creating small two to five acre openings, and including the removal of trees over 21 inches in diameter. The openings would be placed in those stands most impacted by mistletoe primarily in the Crescent Butte subwatershed at the north end of the planning area. Some openings would also be created in the North Paunina and Little Walker subwatersheds on either side of Highway 97. Because this alternative would selectively target mistletoe, impacts to butterfly host plants and food sources would be greater in this alternative than Alternative C that proposes the same units and acreage but does not create openings.

**Determination**
Similar to the other action alternatives, mitigation measures and Project Design Features are in place for the retention of unburned patches of shrub habitat and 15-25 percent no harvest treatment acreage for each thinning unit, that would still maintain mistletoe infected trees and butterfly host plants across the planning area but at a reduced level compared to Alternatives B and C. Based on these assumptions, the determination is **"May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species"** for the Johnson's hairstreak.

**Alternative E**
**Direct and Indirect Effects**
The selection of this alternative proposes the greatest amount of commercial thinning, small diameter thinning, and prescribed underburning of the four action alternatives. A total of 11,236 acres of thinning would occur in addition to 3,780 acres of brush mastication followed by prescribed fire, and an additional 1,205 acres of thinning small diameter trees, pruning of limbs and application of prescribed fire. This would result in a total of 16,221 acres of treatments on the 40,000 acre planning area. Similar to Alternative D, mistletoe control is a desired objective and approximately 1,921 of the most heavily infected stands of ponderosa pine with mistletoe would experience an alternative treatment. On the 1,921 acres all the trees under 21 inches diameter would be removed and those over 21 inches could be targeted for induced mortality through prescribed burning, blasting or topping the mistletoe infected portion of the tree. Post-treatment planting of ponderosa and/or sugar pine seedlings would occur to develop into future late and old structure forest. Because this alternative proposes the highest amount of thinning and prescribed burning of the four action alternatives, it would also have the greatest potential for mistletoe removal and impact on host plants and food sources for the butterfly.

**Determination**
Similar to the other action alternatives, mitigation measures and Project Design Features are in place for the retention of unburned patches of shrub habitat and 15-25 percent no harvest treatment acreage for each thinning unit, that would still maintain mistletoe infected trees and butterfly host plants across the planning area but at a reduced level compared to Alternatives B, C, and D. Based on these assumptions, the determination is **"May impact individuals or habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species"** for the Johnson's hairstreak.

**Cumulative Effects**
Table 19 was reviewed for project actions that have a similar zone of influence and overlap in time and space as the Rim-Paunina vegetation management project. There are no projects in the table that overlap in time and space with Rim-Paunina, therefore additive cumulative effects are not anticipated to occur. The approximately 106 acres of private land acreage within the planning area is within the Two Rivers North rural housing subdivision. It is currently unknown how much private land acreage of lodgepole pine may be infected with mistletoe or if Johnson's hairstreak is present on those lands.

## Management Indicator Species

During the preparation of the Deschutes National Forest Land and Resource Management Plan (USDA LRMP 1990), a group of wildlife species were identified as Management Indicator Species (MIS). Certain wildlife species have been identified in the Deschutes National Forest Final Environmental Impact Statement Land and Resource Management Plan (EIS) and selected as MIS because their populations are believed to be influenced by forest management activities. They were chosen because they: (1) are designated as Proposed, Endangered, Threatened, or Sensitive on Federal or Oregon state lists, or; (2) have special habitat needs that may be influenced significantly by planned management activities, or; (3) are popular for hunting or trapping, or; (4) are nongame species of special interest, or; (5) indicate the effects of management for other species within major biological communities (EIS 1990. 3-14). The MIS species welfare can be used as an indicator of other species dependent upon similar habitat conditions. Indicator species can also be used to assess the impacts of management actions on a wide range of other wildlife with similar habitat requirements. The species listed in Table 32 were selected for the Deschutes National Forest.

**Table 32. Deschutes National Forest Management Indicator Species and Presence within the Analysis Area**

| Species | Habitat | Indicator For | Species Present | Habitat Present |
|---|---|---|---|---|
| Northern Goshawk | Open forests with a mosaic of large trees, snags and down wood suitable for foraging, nesting and post-fledgling areas. Unforested habitats | Dense Mature and Old Growth Ponderosa Pine, also Lodgepole Pine, Mixed-Conifer Forests (Biological Community Barometer Species) | Yes | Yes |
| American Marten | Mixed conifer and high elevation hemlock/lodgepole pine late-successional forests | Dense, Multi-Layered, Mature, and Old Growth Forest, also Lodgepole Pine and Mtn. Hemlock Forests (Biological Community Barometer Species) | Yes | Yes |
| Cooper's Hawk | Deciduous and mixed conifer forest, open woodlands and riparian woodlands. Found in large forests, but more likely to occur near forest edges and clearings near lakes and streams | Dense Forest Species | Yes | Yes |
| Sharp-shinned Hawk | Deciduous and mixed conifer forest, open woodlands and riparian woodlands. Found in large forests, but more likely to occur near forest edges and clearings near lakes and streams | Dense Forest Species | Yes | Yes |
| Red-tail Hawk | Large trees in mixed habitat | Non-Game Species of Special Interest | Yes | Yes |

| Species | Habitat | Indicator For | Species Present | Habitat Present |
|---|---|---|---|---|
| Great Gray Owl | Mature to old growth coniferous and mixed conifer/lodgepole pine forests adjacent to opening in forests, usually meadows | Edge Species | Yes | Yes |
| Osprey | Nests within 2 miles of fish baring bodies of water | Non-Game Species of Special Interest | No | No |
| Waterfowl | Lakes, Ponds, Streams, Wet Meadows | Popular for Hunting or viewing | No | No |
| Golden Eagle | Elevated nest sites in open country | Non-Game Species of Special Interest | No | No |
| Great Blue Heron | Estuaries, Streams, Marshes, Lakes | Riparian Species | No | No |
| Northern Bald Eagle (See TES) | Lakeside, Reservoirs, Large Trees | TES | Yes | Yes |
| Northern Spotted Owl (See TES) | Late and old-structured Mixed conifer forest | TES | No | No |
| American Peregrine Falcon (See TES) | Cliffs and Riparian | TES | Not Documented | No |
| Wolverine (See TES) | Mixed forests, High elevations | TES | Not Documented | Yes |
| Townsend's Big-eared (See TES) | Roost sites in building, caves and bridges | TES | Not Documented | No |
| Mule Deer | Mosaic of early, forage-producing stages and later, cover-forming stages of forests, i.e. conifer, ponderosa pine, lodgepole pine and mixed ponderosa/lodgepole pine forest with shrub understory, in close proximity | Popular for Hunting or viewing | Yes | Yes |
| Elk | Mosaic of early, forage-producing stages and later, cover-forming stages of forests, in close proximity | Popular for Hunting or viewing | Yes | Yes |
| **Woodpecker Guild** | | | | |
| Lewis' Woodpecker (See TES) | Open woodland habitat near water | TES (Snags) | Yes | Yes |
| Red-naped Sapsucker (See BCC) | Pine/aspen forests with riparian habitat | Snags | Yes | Yes |
| White-headed Woodpecker (See TES) | Open ponderosa pine or mixed-conifer forests dominated by ponderosa pine. Densities increase in large diameter or old-growth sites. | TES (Snags) | Yes | Yes |
| Black-backed Woodpecker | Conifer forests including ponderosa pine, lodgepole pine, Douglas -fir/mixed conifer with high proportions of dead trees | Snags | Yes | Yes |

| Species | Habitat | Indicator For | Species Present | Habitat Present |
|---|---|---|---|---|
| Three-toed Woodpecker | Lodgepole pine, mixed-conifer, Douglas -fir/mixed conifer forests at high elevations | Mature and Old Growth Lodgepole Pine Forest, also Forests with Engelmann Spruce or Mtn. Hemlock (Biological Community Barometer Species) | Yes | Yes |
| Hairy Woodpecker | Mixed-conifer and ponderosa pine forests adjacent to deciduous stands | Snags | Yes | Yes |
| Downy Woodpecker | Aspen stands with riparian habitat, Less common in mixed conifer and ponderosa pine forests | Snags | Yes | Yes |
| Williamson's Sapsucker | Mid- to high-elevation mature or old-growth conifer forests with fairly open canopy cover | Snags | Yes | Yes |
| Northern Flicker | Open forests and forests edges adjacent to open country, Terrestrial habitats | Snags | Yes | Yes |

Effects to the northern bald eagle, northern spotted owl, American peregrine falcon, wolverine, white-headed and Lewis's woodpeckers, and Townsend's big-eared bat are discussed in the Proposed, Endangered, Threatened, and Sensitive Species section, also in this Chapter. The red-naped sapsucker is discussed in the Birds of Conservation Concern section, also in this Chapter. All other species are discussed within this MIS section.

**Raptor Nesting Seasons**

The Deschutes National Forest Plan provides Standards and Guidelines specifying the following periods for limiting disturbance to nesting golden eagle, osprey and red-tailed hawk (DLRMP, WL-3) as shown in Table 33. The nesting periods for the remaining species are the commonly accepted dates used by the Deschutes National Forest.

**Table 33. Nesting Period for Raptors**

| Species | Nesting Period |
|---|---|
| Cooper's Hawk | April 1-August 31 |
| Golden Eagle | February 1-July 31 |
| Northern Goshawk | March 1-August 31 |
| Osprey | April 1- August 31 |
| Red-Tailed Hawk | March 1- August 31 |
| Sharp-shinned Hawk | April 15-August 31 |

**MIS Assumptions**

- Project activities from the Three Trails OHV EIS may alter the quality, effectiveness, and distribution of wildlife habitat available to some management indicator species in the planning area. For the Rim-Paunina analysis area, it is assumed the Three Trails OHV management activities have been or are in the process of being completed. For example, road closures are already in effect, OHV trails are constructed or are in the process of being constructed, and rehabilitation of designated roads have been completed or are in the process.

- No new system roads would be constructed to implement the Rim-Paunina project although temporary roads would be constructed and then returned to hydrological conditions after the completion of all project actions.

- The wildlife sightings discussed in the following sections came from random observations while conducting other forest management activities and from species specific surveys as noted. There can be considerable overlap of habitat for some species based on the habitat definitions used to model acres of habitat.

- Wildlife sightings are from observers whose wildlife identification skills range from limited to experienced. Thus, some wildlife sightings may be incorrectly identified skewing total observation detections of species.

- All vegetation Historic Range of Variability (HRV) information within the MIS section was taken from the Forest Vegetation section in Chapter 3. This includes descriptions of historic and current vegetation data and affects of activity units on vegetation, insect, and disease. All fire related information within the MIS section was taken from the Fire and Fuels section in Chapter 3. This includes discussion on historic and current fire regimes and events, as well as how activity units affect the landscape, insect, and disease.

- For the Rim-Paunina vegetation project, the snag and down wood analysis area is the Deschutes National Forest portion of the Little Walker Mountain watershed; approximately 80,000 acres. The Rim-Paunina project analysis of species habitat is 40,000 acres, with habitat projected to change over time in response to proposed treatments. Change would be most evident after year 2018, when it is approximated that all project implementation of activity units would be completed. After year 2018, forest vegetation would begin to react to treatments, with the resultant growth potentially changing species habitat.

## Northern Goshawk

### Ecology

The northern goshawk is the largest member of the accipiter family and is distributed across most of Canada, the northern and western United States, and into Mexico. Reynolds et al. (1978) located goshawk nests in Oregon from 580 meters elevation on the west slopes of the Cascades to 1,860 meters. Reynolds et al. (1992) stated preferred nest stands have a minimum of 40 percent canopy cover and the nest sites within these stands have greater than 60 percent canopy cover. Greenwald et al. (2005) reviewed goshawk nesting data and found that a majority of studies found a selection for stands with greater than 40 percent canopy as suitable goshawk nesting habitat. Vegetation plot data collected from Deschutes National Forest goshawk nest sites showed canopy cover ranging from 49-94 percent (USDA 1993). For these reasons, nesting habitat is thought to be the limiting factor when looking for a habitat. Foraging areas are typically 4,900-5,900 acres, comprised of a forest mosaic that must support a wide range of suitable prey including ground dwellers or those occurring near the forest floor (e.g. ground squirrels, birds, small mammals (Marshall et al. 2003)).

Wisdom et al. (2000) listed several issues, strategies, and management practices pertaining to northern goshawks in the Interior Columbia Basin assessment. There have been large transitions from shade-intolerant to shade-tolerant tree species leading to possible unsustainable conditions of old forests resulting from fire exclusion. This has resulted in an increased susceptibility to stand-replacing fires. Wisdom also stated that long-term maintenance of foraging areas is as important for successful reproduction as protection of the immediate nest stand. To address these issues he recommends a variety

of cover types and structural stages within the home range of each active nest. Management practices that would assist in habitat risk reduction include thinning and fuels reduction activities (i.e. prescribed fire, mastication, pruning, limbing, small diameter tree thinning). These practices encourage the development of forest openings, shrub openings, shade-intolerant and fire-, insect-, and disease resistant tree species, and reduce fuel loading.

Reynolds et al. (1982) found northern goshawks commonly nested in trees with deformities caused by dwarf mistletoe in eastern Oregon. The mistletoe induced deformities (e.g. witches brooms, doubled trunks, or heavy foliage) were used as nesting structures. Although some of the changes induced by mistletoe infestation on ponderosa or lodgepole pine stands benefits a variety of wildlife, over time, mistletoe related changes can be detrimental to some goshawk prey species, and are not desirable in post-fledging family and foraging areas (Schmitt 1996). Severely infected stands may cease developing and not develop into late and old structure. Schmitt (1996) and Reynolds et al. (1983) suggest management recommendations for developing desired future conditions would include sanitation thinning treatments. The risk of stand replacement fire is much greater in severely-infected stands and should be a primary concern where wildlife use values are high (Schmitt 1996).

Sauer et al. (1996 cited in Wisdom et al. 2000) determined that breeding bird survey data for goshawk was insufficient to determine population trends for any state or physiographic region within the Interior Columbia River Basin because of low detection rates. However, sufficient data was available to indicate a stable trend in numbers between the years 1966-1995 for western North America. Breeding bird surveys provided insufficient data to determine population trends within any state or physiographic province in the Interior Columbia Basin. The Oregon Natural Heritage Information Center maintains a list of the most current information available on the distribution and abundance of animals native to Oregon. For the state of Oregon, they rank the northern goshawk population in Oregon as S3, ‘Vulnerable’, but nationally they are demonstrably wide-spread, abundant, and secure, or G5 (NatureServe 2011).

For the Deschutes National Forest northern goshawk observation records, there are a total of 381 detections and 113 recorded nests. From this total, the Crescent Ranger District wildlife records show 96 observations of northern goshawks and 12 nest sites. However, 18 of the ninety-six observations occurred since 2000. In addition, two of twelve nest sites were observed since 2000; one in 2010 and the other in 2001. Goshawk surveys, using recorded adult alarm calls and wailing calls, have occurred in the Little Walker Mountain watershed since 2001 with the exception of 2002, due to overlap with BLT surveys. Surveys conducted in 2008 confirmed one additional northern goshawk response on Walker Rim. Other wildlife surveys conducted in 2010 resulted in the location of a goshawk nest occupied by a female adult and three juveniles on Cappy Mountain in the Oregon Cascades Recreation Area, outside the Rim-Paunina planning area. As of January 2012, no known nests have been documented in the project area. There are nine documented observations of northern goshawk in the Little Walker Watershed for the Crescent Ranger District section. Northern goshawk observation points are scattered on the west side of Highway 97 and in the Walker Rim area.

**Existing Condition**

The Viable Ecosystem model was used to determine an estimated acreage of potentially suitable goshawk nesting habitat (Figure 7). The nesting definition used was lodgepole pine, ponderosa pine, and mixed-conifer Plant Association Groups (PAGs), with tree diameters greater than nine inches, and having an estimated closed canopy of 40-55 percent for lodgepole pine, 25-40 percent for ponderosa pine, and 25-55 percent for mixed-conifer. Canopy cover greater than the threshold percentages for all three PAGs is more sought after by goshawks. Potential nesting habitat is scattered across the project area with concentrations on Walker Rim and in the central portion. Modeling may overestimate actual nesting habitat available. For the Deschutes National Forest, potential nesting habitat was modeled resulting in

446,402 acres. This nesting habitat is scattered in lodgepole pine, ponderosa pine, and mixed-conifer PAG types across the three districts.

For the Rim-Paunina project area, the modeling datasets used for canopy closure class, stand structure class, PAG, and species are from 2009. All timber sales, fuel reduction activities, natural disturbance events such as wildfire, and vegetation activities on private lands within the Rim-Paunina analysis area were included in this information. All activities that occurred after 2004 and their potential incremental effects within the Rim-Paunina area are discussed further in the cumulative effects section.

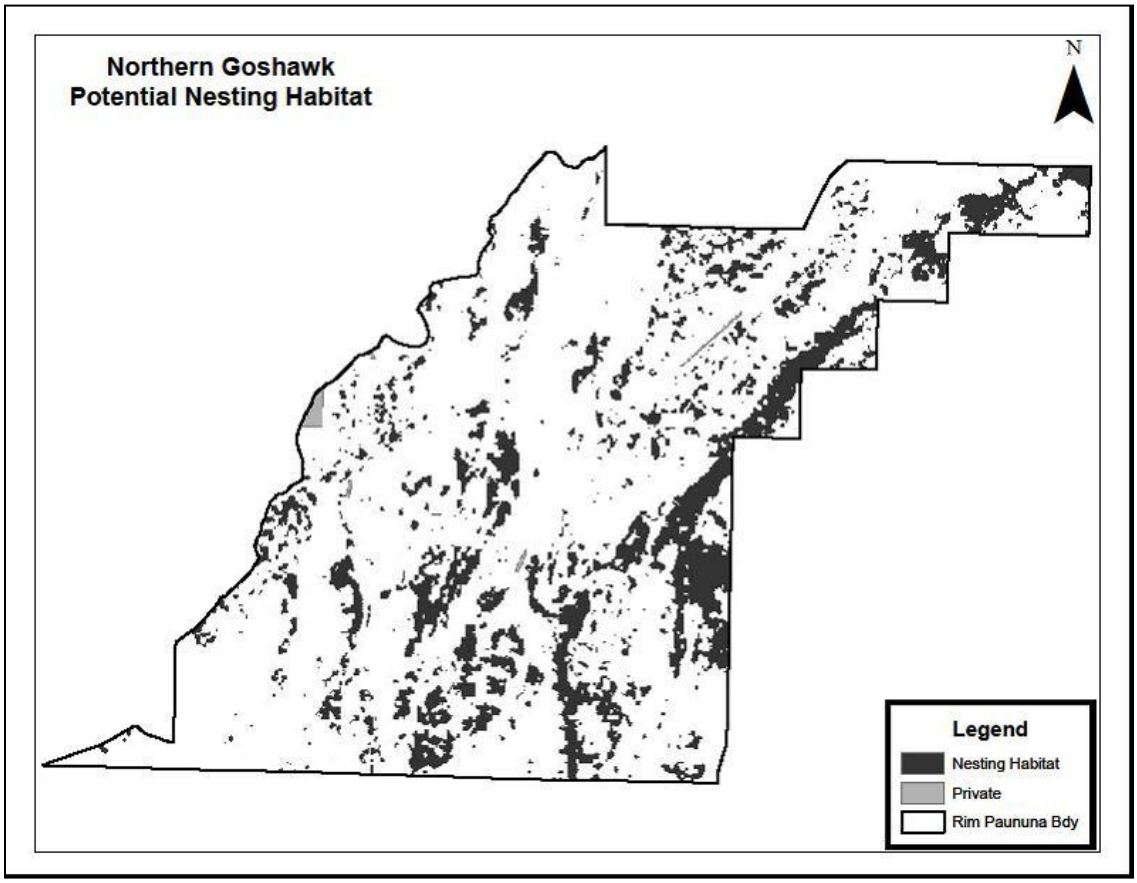



**Figure 7. Potential Northern Goshawk Nesting Habitat based on the Viable Ecosystem Model**

The Rim Paunina project area encompasses 13 percent of the Crescent Ranger District. The project area is predominantly dense lodgepole forest (43 percent), with 33 percent of the project acres in ponderosa pine, and 27 percent in mixed-conifer. With fire suppression and past harvest practices (i.e. clear cutting in response to mountain pine beetle attacks, subsequent salvage harvests, and commercial thinning), these three PAG types have exceeded the Historic Range of Variability (HRV) in some structural stages. What once was dominated by open multi-story or open single-story forests has been replaced with dense multi-story ponderosa pine, lodgepole pine, and mixed-conifer forests. Early fire suppression shifted the historic fire regime, creating fewer low intensity fires needed to naturally thin these PAG types (see Fire and Fuels Chapter 3). High tree densities increase the risk of beetle infestation, mistletoe infection, and fire events. These events can cause wide-scale morality on the landscape, reducing nesting and foraging habitat for northern goshawks.

Potential suitable northern goshawk nesting habitat was modeled resulting in an estimated 7,350 acres, within the Rim-Paunina project area using the Viable Ecosystem Model. This habitat is scattered across the project area, with a large concentration on Walker Rim and in the south central area. The modeled nesting habitat is predominantly within ponderosa pine (4,412 acres - 60 percent) and mixed-conifer, (2,598 acres - 35 percent) PAG types. For project analysis, goshawk nesting habitat is the limiting factor for modeling, because potential foraging habitat is located in the both dense and open lodgepole pine, ponderosa pine, and mixed-conifer stands found throughout the entire project area. While the estimated nesting habitat acreage seems low, current vegetation conditions within the Rim-Paunina project area are above HRV. Increasing tree density levels are causing dense multi-story forests, providing increased goshawk nesting habitat that did not exist historically.

Current forest structure in the Rim-Paunina project area is at least partially the result of decades of fire suppression. This has resulted in an increase in closed canopy stands with a dense lodgepole or conifer understory which may not be as valuable for goshawks as the more open stands that occurred previously. Furthermore, the stands have increased mistletoe infection and pine beetle infestation. Reynolds et al. (1992 cited in Wisdom 2000) found a high density of small diameter trees may be detrimental to foraging and nesting aspects of goshawk ecology in at least three ways: (1) by obstructing flight corridors used by goshawks to obtain forest-associated prey; (2) by suppressing tree growth needed to produce large diameter trees for nest sites; and (3) by reducing the growth of an herbaceous understory that supports potential prey species. Mistletoe infection slows down tree growth producing dwarfed trees that may not have the structure to support nests, can make quality trees more susceptible to insect infestation, or may eventually kill the host tree. By not treating the infected trees, the mistletoe would spread to other trees, reducing quality habitat. Likewise, beetle infestation kills trees, usually those with a larger diameter, reducing the amount of quality trees and overstory needed to support optimal nesting habitat.

Table 34 summarizes the effects of proposed management activities to existing goshawk habitat in the Rim Paunina project area by alternative. The ‘Acres Remaining’ column is assumed potential nesting habitat acres once project implementation is completed in 2018. Alternative E for goshawk hawk treats the most habitat acres with project implementation. The percent difference between all action alternatives is nominal, except for Alternative B. Alternative B proposed actions treat the least amount of habitat in returning existing conditions in the Rim-Paunina project area to HRV, focusing on ponderosa pine PAG types.

**Table 34. Acres of Potential Goshawk Nesting Habitat within the Rim Paunina Project Area (National Forest System Lands only)**

| Alternative | Goshawk Nesting Habitat Acres | | |
|---|---|---|---|
| | Pre-Treatment | Acres Treated* | Acres Remaining |
| **A** | 7,350 | 0 | 7,350 (100%) |
| **B** | 7,350 | 2,598 (35%) | 4,752 (65%) |
| **C** | 7,350 | 3,833 (52%) | 3,517 (48%) |
| **D** | 7,350 | 3,833 (52%) | 3,517 (48%) |
| **E** | 7,350 | 3,977 (54%) | 3,373 (46%) |

*Acres Treated Are Potential Foraging Habitat

The Rim-Paunina project existing condition also includes a 660 foot disturbance zone on all roads and motorized routes. The 660 foot disturbance zone represents existing and potential disturbance from vehicle use on roads and motorized routes (Forman et al. 2003). The assumption is disturbance would continue to effect habitat within the road effect zone (200 meters (~660ft) each side of roads or motorized trails; Forman et al. 2003). Decreased habitat quality, reduced reproductive potential, and avoidance of the roads and motorized routes effect zones are potential effects as a result of habitat alteration physically or due to disturbance. Table 35 shows the amount of undisturbed and disturbed nesting habitat within the project boundaries. In comparing action alternatives, there is minimal difference between nesting acres within or outside the disturbance zone, even over time. The acres of habitat inside the disturbance zone might be unsuitable nesting habitat, but could be suitable for foraging habitat. Alternatives C and D management activities result in the most potential nesting habitat over time. Alternative C has the most in 2018 and Alternative D has the most in 2058. However, the change in the amount of acres is nominal when compared across action alternatives.

**Table 35. Acres of Northern Goshawk Nesting Habitat in Undisturbed and Disturbed Zones for the Rim-Paunina Project Area**

| | Inside Disturbed Zone | | Outside Disturbed Zone | |
|---|---|---|---|---|
| | Year | | | |
| **Alternative** | **2018** | **2058** | **2018** | **2058** |
| **A** | 4,610<br>51% | 15,734<br>55% | 4,379<br>49% | 12,621<br>45% |
| **B** | 3,532<br>48% | 13,312<br>55% | 3,794<br>52% | 10,855<br>45% |
| **C** | 3,616<br>49% | 13,703<br>54% | 3,823<br>51% | 11,454<br>46% |
| **D** | 3,544<br>49% | 13,837<br>55% | 3,736<br>51% | 11,534<br>45% |
| **E** | 3,356<br>57% | 13,271<br>55% | 2,575<br>43% | 11,029<br>45% |

Gunnison National Forest Travel Management Plan, USDA (2001) and Hamann et al. (1999) suggested in their literature reviews of motorized disturbance on raptors section that sensitivity occurs near nest sites and mainly effects eggs or young, resulting in nest and young abandonment as well as increased stress levels. Direct activities, such as noise from vehicles, could disturb these raptors during nesting and foraging and may negatively affect them. These species may be sensitive to prolonged OHV use adjacent to their nest (USDA 2001 and Hamann et al. 1999). USDA (2001) and Hamann et al. (1999) also found prolonged disturbance during nesting season may result in nest and young abandonment and increased stress levels.

Alternatively, studies have found that walking straight to a birds' nest (including raptors) is more disruptive than vehicle or OHV use (Lee 1981; Skagen 1980; Holmes et al. 1993; Burger and Gochfeld 1998 pages 151, 220, 222 and 223; Gill et al. 1996). Specifically, a northern goshawk and Cooper's hawk study, conducted by Lee (1981), found female goshawk did not show signs of agitation or flushing from snowmobiles until the riders stopped and got off their machines. In another observation, Lee (1981) found female hawks did not flush from nests when motorcycles passed by. These and other occasions are examples why Lee (1981) concluded hawks may become habituated to moving machines. In addition,

Lee (1981) also stated hawks may tolerate "disturbances", hikers, snowmobiles, motorcycles, and horseback riders, so they can keep territories that meet resource needs.

Raptors have been known to use small two-track roads and trails that experience low use and have existing canopy cover on the sides as foraging habitat (Flecher at al. 1999; St. Pierre 2008). Some avian scavengers prefer to use these types of open areas because vegetation may hide potential predators while they are feeding (Skagen et al. 1991).

**Direct and Indirect Effects**

**Alternative A – No Action**

Implementation of this alternative would have no immediate direct effect on northern goshawks. Undiscovered pairs if present in the project area would be unaffected by vegetation management actions. Some levels of insect and disease can be a factor in causing tree mortality, decay, and/or deformity, which can be key attributes for goshawk nesting or foraging habitat (Graham et al.1999). However, in the long-term, without treatment overcrowding and competition in the ponderosa, lodgepole pine, and mixed-conifer stand would lead to an increased mortality level in large diameter trees, which is evident now. Overcrowding conditions in these stands also elevate mistletoe infection and beetle infestations resulting in reduced tree vigor leading to premature tree mortality. In addition, high tree density creates spatial continuity within the three PAG types increasing the risk of forest replacement fires. Many forested stands are still at risk of catastrophic wildfire events similar to the Davis Fire, which resulted in the long-term loss of over 16,000 acres of suitable habitat.

Alternative A would not allow for tree density thinning, reducing spatial continuity in forests, reducing stand competition to maintain desired late- and old structural habitats closer to historical levels across the project area, or improve forest health. More specific to northern goshawk habitat, under Alternative A tree densities would remain above HRV and would obstruct flight corridors, thus decreasing foraging opportunities. High tree densities can also suppress tree growth and hinder branch development both needed for suitable nesting structure. Alternative A presents the greatest risk of losing goshawk habitat due to a wide-scale disturbance event caused by beetle infestation, mistletoe infection, and/or fire events. The combination of these events would compound the long-term loss of northern goshawk nesting and foraging habitat.

Under the no action alternative, northern goshawk nesting habitat within and outside the disturbance zone would increase both in the short-term (2018) and long-term (2058). The current level of disturbance from motorized vehicles would continue within the disturbance zone, as in all action alternatives. The majority of roads and routes have been in place on the district for several decades and some level of habituation to motorized traffic may have occurred. Lee (1981) found that northern goshawk can become habituated or tolerate motorized vehicles in such they occupy the same territory.

**Effects Common to All Alternatives**

Figure 8 illustrates action alternative nesting acreages growing over time as a result of expected increase in tree vigor from thinning, reducing overcrowded stands, fuel loading, and the probability of advancing stands to the next successional stages. As trees become larger and the forest density increases, more habitat would be available for nesting; however, there would also be an increase in the potential for a stand replacement event (e.g. insect, disease or fire). For year 2018, Alternatives B, D, and E all decreased the habitat acres when compared to the existing condition. From Table 36, Alternative E treats the most potential nesting habitat (3,977 acres) and, thus, provides the least amount of acres after implementation (5,931 acres). Alternative C treats 3,834 acres of potential nesting habitat, but provides the most habitat by year 2018 (7,439 acres), after implementation. In year 2058 all action alternatives increase the amount of projected healthy suitable habitat above the existing condition. Alternatives C and

D are projected to provide the most goshawk nesting habitat out of the action alternatives due to the proposed management activities.

However, without continued treatment of stands (i.e. - fire regime or thinning), stand density would continue to increase out to 2058, moving forests above HRV levels once again. Increased density levels increase the risk of beetle infestation, mistletoe infection, and fire events. With implementation of treatment units, activity in ponderosa pine would likely render the immediate area as unsuitable goshawk nesting habitat. Management activities for all action alternatives would reduce stand density and return vegetation conditions to historic HRV levels. In the short-term, these management activities would reduce canopy cover under the 60 percent, noted by Reynolds et al. (1978), rendering some activity units unsuitable for nesting habitat, but potentially suitable for foraging.

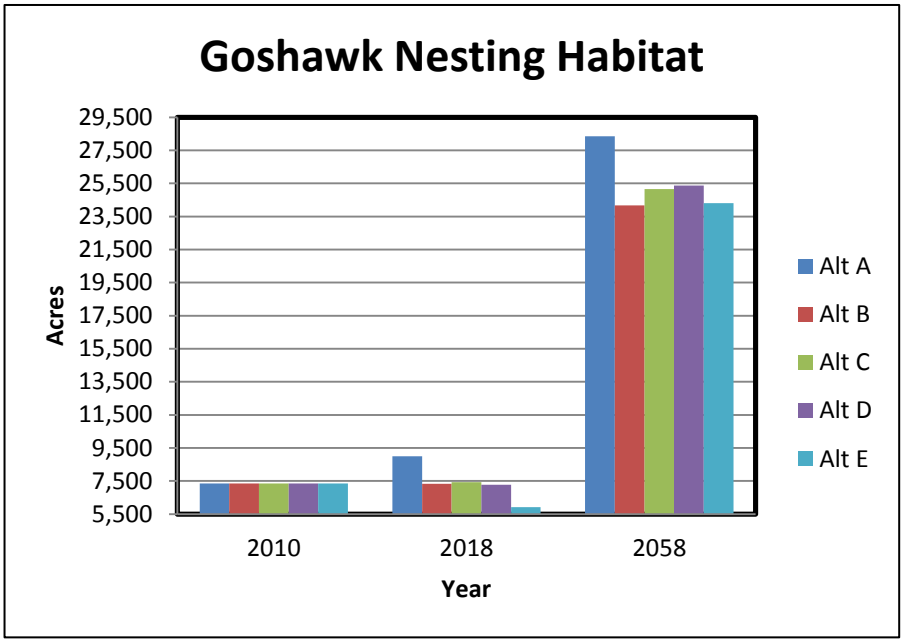



**Figure 8. Viable Ecosystem Modeling Projection of Goshawk Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 36. Viable Ecosystem Modeling Projection of Goshawk Nesting Habitat Acres over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Goshawk Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 | 2018 | 2058 |
| A | 7,350 | 8,989 | 28,355 |
| B | 7,350 | 7,325 | 24,167 |
| C | 7,350 | 7,439 | 25,157 |
| D | 7,350 | 7,279 | 25,371 |
| E | 7,350 | 5,931 | 24,300 |

The proposed commercial thinning is designed to reduce stem densities and improve forest health, particularly in stands infected with mistletoe, infested with bark beetles, or in overall poor health, and would primarily remove trees less than 21 inches diameter. Post-sale treatments would include small-tree thinning, slash removal, mastication, and underburning where desired. This combination of effects would likely preclude these stands from remaining as nesting habitat in the short term because of the reduced canopy cover. However, the change in cover types would enhance the quality of this acreage for goshawk

foraging on the short-term level. Hargis et al. (1994 cited by Wisdom 2000) stated goshawk foraging occurs in various cover types and structural stages, and the juxtaposition of several habitats may enhance the quality of foraging habitat around nest sites. Those post-sale treatments that include low entry underburning would stimulate vegetation growth for prey species. In proposed activity units, snags are not designated for removal, except in hazardous circumstances, and coarse woody material would be available for goshawk prey base habitat. However, re-entry with fire would decrease vegetation growth and could remove possible habitat.

In addition, at least 15 percent of each proposed activity unit would be managed in a passive scenario. The retention of untreated acres may be capable of providing a goshawk nest stand where appropriate structure exists. Because well distributed nesting habitat is available to function as future replacement, there would be no reduction in the numbers of goshawk home ranges that can be supported across the analysis area. In addition, there would be no loss of Late and Old Structured habitat, because the largest trees would be retained, except in Alternative D. In Alternative D, due to the removal of severely mistletoe-infected trees over 21 inches, there would be some loss of LOS habitat (approximately 145 acres). Within younger-aged stands, reduced competition for scarce resources as a result of thinning would allow the residual trees to increase their size potential. Also, management practices would encourage development of a more resilient forest, e.g. reducing the risk of disease, infestation, and fire events in nesting habitat.

All action alternatives are consistent with recommendations by Reynolds et al. (1992) to reduce small tree densities to improve foraging habitat and increase the growth of residual trees. Activity units that maintain 40 percent and above canopy cover would convert to goshawk foraging habitat. Implementation of action alternatives would also contribute to a diversity of cover types and seral stages across the landscape needed by goshawks, as described by Wisdom et al (2000). However, post-harvest canopy cover in some treatment units may fall below the 40 percent level described by Reynolds et al. (1991) as suitable goshawk nesting habitat (e.g. ponderosa pine PAG types).

For each action alternative, the small diameter thinning and fuels reduction activities along with the commercial harvest units would benefit goshawk nesting habitat by reducing small diameter trees that are competing with the overstory. For example, under all action alternatives, ponderosa pine stands should return to HRV. Proposed activity units would open a stand's understory by removing some shrub and small diameter trees, thus providing space to encouraging tree growth. However, in the short-term the altered habitat is more conducive to goshawk foraging habitat than nesting habitat. All dead and standing trees would remain except for occupational safety, clearing for log landings, and temporary road construction. Temporary road construction for harvesting in all action alternatives would benefit the foraging capability by providing flight lanes for prey access (Flecher at al. 1999; St. Pierre 2008). The 15 foot clearance for these temporary roads would be sub-soiled or rehabilitated once harvesting is completed.

Table 35 shows the amount of potential nesting habitat for the northern goshawk within and outside the disturbance zone. The potential goshawk nesting habitat acreage for all action alternatives increase over years 2018 and 2058 and is evenly scattered throughout the Rim-Paunina area. Decreased habitat quality, reduced reproductive potential, and avoidance of the roads and motorized trails effect zones are potential effects as a result of habitat alteration physically or due to disturbance. In all alternatives, the utilization of habitat for nesting within the disturbance zone may be unlikely. Science is conflicted on whether some habituation or tolerance occurs (Lee 1981), or whether any human disturbance, motorized or other, can affect the nest (USDA 2001 and Hamann et al. 1999). In summation, the projected goshawk nesting habitat for all action alternatives would increase over time and is evenly scattered throughout the Rim-Paunina area, including habitat within and outside the disturbance zone.

All understory removal would result in the reduction of some habitat for goshawk prey species in the short term. In the long term, the understory would re-grow providing habitat for prey species again. The exception is where maintenance burning is prescribed on an 8-15 year cycle. Additionally, in the long term removing brush would open the understory enough for foraging and provide space where trees can grow the large limbs sought after by goshawks for nesting and roosting.

**Effects Common to Alternatives C, D, and E**

For Alternatives C, D, and E, in addition to commercial and post-harvest activities, Rim-Paunina proposes 'fuels only' activity units. These units, mainly in ponderosa pine PAG types, reduce understory and spatial continuity through brush and slash mastication, prescribed underburning, pruning trees up to eight feet or 1/3 of the crown, handpiling and burning of slash, thinning trees eight inches in diameter and under, and maintenance burning every 8-15 years.

**Effects Common to Alternatives D and E**

In addition to understory and fuel treatments in activity units, Alternatives D and E propose the removal of severely dwarf mistletoe infected trees. Alternative D would create 2-5 acre openings on 778 acres, in which all infected trees, including those over 21 inches would be removed. In contrast, Alternative E would remove only mistletoe-infected trees less than 21 inches in diameter across 1,921 acres of the most severely infected stands, and would induce tree mortality on severely infected trees 21 inches and greater. All openings would then be replanted with ponderosa pine saplings, sugar pine, or lodgepole pine saplings creating patches free from dwarf mistletoe.

These treatments within mistletoe-infected areas would minimize the cycle of dwarf mistletoe, reducing infection and creating a more resilient forest within the Rim-Paunina project area. In the short-term nesting habitat would be lost, but the 778 acres is only two percent of the project area. There would still be 3,833 acres (52 percent) of nesting habitat outside the activity units for Alternative D and 3,977 acres (54 percent) for Alternative E. In the long term, proposed mistletoe treatment areas for Alternatives D and E would grow back adding to nesting habitat.

**Direct and Indirect Effects**

**Alternative B**

Implementation of this alternative would result in management activities on 2,598 acres (35 percent) of goshawk nesting habitat in the project area. Within this habitat, Alternative B proposes to develop, maintain, and enhance late- and old structured stand characteristics suitable for certain species dependent on ponderosa pine stands, like the white-headed woodpecker. Management actions would also include prescribed fire to return fire-dependent stands back to the natural state (i.e. an open, single story stand with little brush component). Proposed project treatments include commercial thinning of 12,036 acres in the Rim-Paunina project area. This treatment acreage includes 3,530 acres of slash removal without underburning, and 8,506 acres of prescribed underburning. Alternative B management activities would initially decrease potential nesting habitat within the Rim-Paunina project area, but over time habitat acreage would increase. Habitat not suitable for nesting would be suitable for foraging.

The treatment of 2,598 acres of the potential nesting habitat would likely have little long-term effect on goshawks. Goshawk nesting and foraging habitat would continue to increase over time with project implementation. Additionally, the majority of suitable habitat for Goshawks is outside the project area to the west towards the crest of the Cascade Mountains.

**Direct and Indirect Effects**

**Alternatives C and D**

Alternatives C and D focus on a strategy to reduce the length of time large trees are absent from areas most heavily infected with dwarf mistletoe, retain decadent lodgepole pine stands, and incorporate a more

historical frequent fire regime in appropriate stands. Alternatives C and D management actions would also provide the most contiguous habitat acres for potential goshawk nest stands when compared to Alternatives B and E. Alternative C proposes habitat for MIS species that favor open ponderosa pine stands, like the white-head woodpecker, and those who prefer a denser multi-storied stand, like the northern goshawk. It also proposes to retain more decadent lodgepole pine stands that would provide habitat both in the short and long-term. Both Alternatives C and D propose 9,792 acres of commercial timber harvest, 2,244 acres less than Alternative B and 1,444 acres less than Alternative E, in the project area. Implementation of these alternatives would result in management activities in 3,833 acres (52 percent) of goshawk nesting habitat in the project area.

Through management actions of Alternatives C and D, 48 percent of the potentially suitable nesting habitat would be maintained in its current condition. Additively, Alternative C proposes passive-managed patches greater than the standard 15 percent in ponderosa pine and lodgepole pine treatment units and fewer acres of commercial thinning. These would provide more contiguous suitable habitat for goshawks, black-backed woodpeckers, marten, and big game and keep a canopy cover needed for protection. As displayed in Table 34, these alternatives show an increasing amount of suitable nesting habitat by 2058 in comparison to the no-action alternative. Because of the well distributed existing and future potential nesting habitat, there would be no reduction in the numbers of goshawk home ranges that can be supported across the analysis area.

While several thousand acres of fuels treatments are proposed in Alternatives C and D, this fuels reduction would not negatively affect the ability of goshawks to nests in these stands. The fuels treatment units would still function as goshawk nesting habitat post harvest, because only the smaller diameter trees and some brush component would be removed. There would likely be little change in the overstory canopy cover and goshawk nesting capability would be maintained. A minimum of 15 to 20 percent of each harvest unit (silvicultural or fuels) would be retained in its present condition and provide goshawk nest structure where suitable. In the long-term, canopy cover would increase and return to a level suitable for nesting (greater than 40 percent), as shown in Table 36.

Alternative D proposes creating 2-5 acre openings in the most severely mistletoe-infected stands, then planting pine seedlings in the openings. These openings include removing unhealthy infected trees over 21 inches in diameter. The scattered openings would encompass a total of 778 acres (2 percent) of the Rim-Paunina project area. In the long term, these stands would create a mosaic of various cover types and structural stages needed for goshawk habitat (Hargis et al. 1994 cited by Wisdom 2000). For the action alternatives, Alternative D would provide the most goshawk nesting habitat in year 2058 (Figure 8).

**Direct and Indirect Effects**

**Alternative E**

Alternative E proposes commercial harvest to reduce stem densities and improve forest health, particularly in stands that are infected with mistletoe, infested with bark beetles, or have overall poor health. This alternative defers treatment of some older and decadent lodgepole stands that are specified for thinning in Alternative B. This would allow for a balance of habitat for MIS species; open ponderosa stands for white-headed woodpecker habitat, as well as multi-story dense stands for northern goshawk habitat. Moreover, Alternative E would provide goshawk habitat in both the short and long-term. After implementation, management activities would result in 3,977 acres (54 percent) of goshawk nesting habitat within the project area.

Management activities would include removal of trees less than 21 inches in 1,921 acres (5 percent of the project areas) of the most severely mistletoe-infected stands and induced mortality to the large diameter trees that are the source of the infection. For source infection trees, induced mortality would be applied.

These trees would be killed, but they would remain in the project area to provide recruitment for snags. Removing five percent of acres within the project area that are severely infected or diseased would not reduce potential nesting goshawk habitat. In addition to tree removal, several thousand acres of fuel reduction treatment are proposed.

While several thousand acres of fuels treatments are proposed in Alternative E, this fuels reduction would not negatively affect the ability of goshawks to nests in these stands. The fuels treatment units would still function as goshawk nesting habitat post harvest, because only the smaller diameter trees and some brush component would be removed. There would likely be little change in the overstory canopy cover and goshawk nesting capability would be maintained. A minimum of 15 to 20 percent of each harvest unit (silvicultural or fuels) would be retained in its present condition and provide goshawk nest structure where suitable. In the long-term, canopy cover would increase and return to a level suitable for nesting (greater than 40 percent), as shown in Table 36.

As described for Alternative B, Alternative E vegetation management activities proposed are consistent with recommendations by Reynolds et al. (1992) to reduce small tree densities to improve foraging habitat and increase the growth of residual trees. With post-harvest, canopy cover in some treatment units may fall below the 40 percent level described by Reynolds et al. (1991) as suitable goshawk nesting habitat. These stands would be converted to foraging habitat for goshawks. Management implementation of Alternative E units would provide more canopy cover available for nesting goshawks as compared to Alternative B.

**Cumulative Effects**

Table 19 in Chapter 2 was reviewed for past, present or future projects with potential for additive effects that would overlap in space and time with those of the Rim-Paunina project. The zone of influence is defined as the 40,000 acre Little Walker Watershed because it is a large enough area to support multiple home ranges. There are no projects which overlap with the Rim-Paunina project area.

Goshawk habitat is generally located on federal lands in and around the project area. The combination of insect, disease and wildfires is expected to reduce the acreage of potential goshawk nesting habitat on the Deschutes National Forest. However, in the long term these actions would provide suitable habitat that would continue to develop, per Reynolds et al. (1992), and reduce risk of loss from a wide-scale disturbance.

Project implementation is not expected to lead to a loss in pair territories in the analysis area or across the Crescent Ranger District. Therefore, no additive cumulative effects to the northern goshawk in general are projected.

**Conclusion**

In the state of Oregon, the northern goshawk is listed as S3 'Vulnerable' through the Oregon Natural Heritage program, due to degradation and loss of habitat (NatureServe 2011). It is assumed, that over the past 6-8 years northern goshawk habitat has been affected through major fire events on the Deschutes National Forest. The Rim-Paunina project would result in more resilient goshawk nesting habitat, i.e. more resilient to infestation, disease, and fire events.

Rim-Paunina, Three Trails OHV, and the Travel Management Plan Environmental Impact Statements all include mitigation measures to protect and maintain raptor nesting habitat in the following ways: (1) seasonal restriction within a ¼ mile of a known nest site, (2) 15-20 percent retention of untreated habitat within treated acres as well as untreated suitable nesting habitat within the project area, and (3) treating stands to be resilient to disturbance, such as wildfires, insect, and disease.

For action Alternatives B, D, and E there is an initial decrease in nesting habitat, but over decades all action alternatives increase goshawk nesting habitat. Action Alternative C results in the highest projected acreage of available nesting habitat in year 2018, while action Alternative D results in the highest projected acreage of available nesting habitat in year 2058. Nest stands would be available in the blocks of habitat within activity units where no active management occurs (15 percent of activity unit) and in nesting habitat outside of activity units. Habitat outside activity units and the retained passive managed patches inside activity units would result in the same effects as Alternative A, the no Action Alternative. Alternative A, is projected to provide the most habitat through year 2058. However, without treatment, Alternative A has the greatest risk of losing goshawk habitat due to a wide-scale disturbance event. The combination of insect, disease, and fire events could lead to the long-term loss of northern goshawk habitat.

In the long-term, the Rim-Paunina would result in more resilient goshawk nesting habitat. Implementation of the action alternatives would contribute to a diversity of cover types and seral stages across the landscape needed by goshawks, as described by Wisdom et al. (2000). Post-harvest canopy cover in some treatment units may fall below the 40 percent level described by Reynolds et al. (1991) as suitable goshawk nesting habitat, but given time would return. Additionally, there are old growth areas that can provide nesting habitat throughout the duration of the Rim-Paunina project implementation. For the Crescent Ranger District, this positive increase would not contribute to a change in the goshawk population. The project area is only a 13 percent of the entire Crescent Ranger District; there is ample nesting habitat elsewhere on district.

Recent Deschutes National Forest analysis shows there are 446,402 acres of modeled nesting habitat for the Northern Goshawk. This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on district there are no accumulative effects. The project area is only a 13 percent of the entire Crescent Ranger District, which is only 22 percent of the Deschutes National Forest. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the northern goshawk.

## American Marten

### Ecology

The American marten is associated with mixed conifer and high elevation hemlock/lodgepole pine late-successional forests. Martens use denning and resting sites more than once during the year (Raphael and Jones 1997). Raphael and Jones (1997) describe denning and resting sites as "refugia from predation and protection from thermal stress; denning sites have similar function and also offer such protection to young." Gilbert et al. (1997) found that denning and resting sites were in upland forests- especially upland conifer and hardwood forests. Raphael and Jones (1997), in a study of lodgepole pine and ponderosa pine forests on the Winema National Forest, determined that marten denning sites averaged 30 percent canopy cover. They also concluded that martens tend to select rest sites with greater canopy cover (mean 36 percent) when snow cover is present as compared to snow-free times (mean 27 percent canopy cover). Additionally, they found that for marten in Oregon, during non snow intervals, denning sites included 35 percent live trees, 32 percent logs and 29 percent slash piles, whereas resting sites were primarily both logs and slash piles (Raphael and Jones 1997). In a Spencer (1987) study, the martens found in trees preferred lodgepole pines. The snags and logs martens use all have intermediate levels of decay, with greatest use in the larger (30 inches in diameter or larger) size classes when available (Raphael and Jones 1997). Martens can use snags and logs as small as 21 inches for denning and 4 inches for resting. In snags, martens have been known to use old woodpecker nest holes (Spencer 1987).

Other preferred habitats include riparian areas, ridge tops, and areas where high concentrations of down logs and snags occur (Ruggiero et al. 1994). Martens eat mostly forest rodent species (e.g. squirrels) or

riparian rodent species (e.g. voles). They also use more resting sites during the summer versus winter, for protection and thermoregulation (Chaplin et al. 1997; Bull and Heater 2000). Complex physical structure, especially near the ground, helps provide foraging/hunting areas and shelter from weather and predators (Buskirk and Powell 1994 as cited in Ruggiero et al. 1994; Bull and Heater 2000). Raphael and Jones (1997) estimated male marten home ranges averaged 4,272 acres and female home ranges averaged 1,392 acres. O'Doherty et al. (1997) noticed in their study that year-round, all the martens maintained a common area within their home range.

**Existing Condition**

The Viable Ecosystem model was used to map potential denning habitat in the analysis area (Figure 9). The definition used for denning habitat was lodgepole pine forests with tree diameters 10-15 inches or greater with dense canopy greater than or equal to 40 percent and white fir, Shasta fir, and mountain hemlock stands with diameters greater than 10-15 inches and a dense canopy equal to or greater than 55 percent. This resulted in an estimated 23,843 acres of potentially suitable denning habitat. However, it is likely the program underestimated acres of denning habitat, because marten would use denning sites with canopy cover levels down to 30 percent (Raphael and Jones 1997), but the Viable Ecosystems model only uses one canopy cover number per Plant Association Group (PAG). Modeling this way would likely underestimate the denning habitat in lodgepole pine and mixed-conifer forests, but may over estimate in ponderosa pine forests. For lodgepole pine, 40 percent is the break between open or dense stands, for mixed conifer and hemlock the break is 55 percent, and for dry ponderosa pine the break between defining stands as open or dense is considered 25 percent. Denning habitat is scattered across the project area with concentrations on Walker Rim and in the western portion. For the Deschutes National Forest, American marten denning habitat was modeled resulting in 433,973 acres. This denning habitat is scattered across the three districts, mainly in mixed-conifer PAG types. For foraging habitat, modeling guidelines used were that martens would use habitat with tree diameters five inches or greater for lodgepole pine forests. The modeling datasets used for canopy closure class, stand structure class, PAG, and species are datasets from 2009. All timber sales, fuel reduction activities, natural disturbance events such as wildfire, and vegetation activities on private lands within the Rim-Paunina analysis area were included in this information. All activities that occurred after 2004 and their potential incremental effects within the Rim-Paunina area are discussed further in the cumulative effects section.

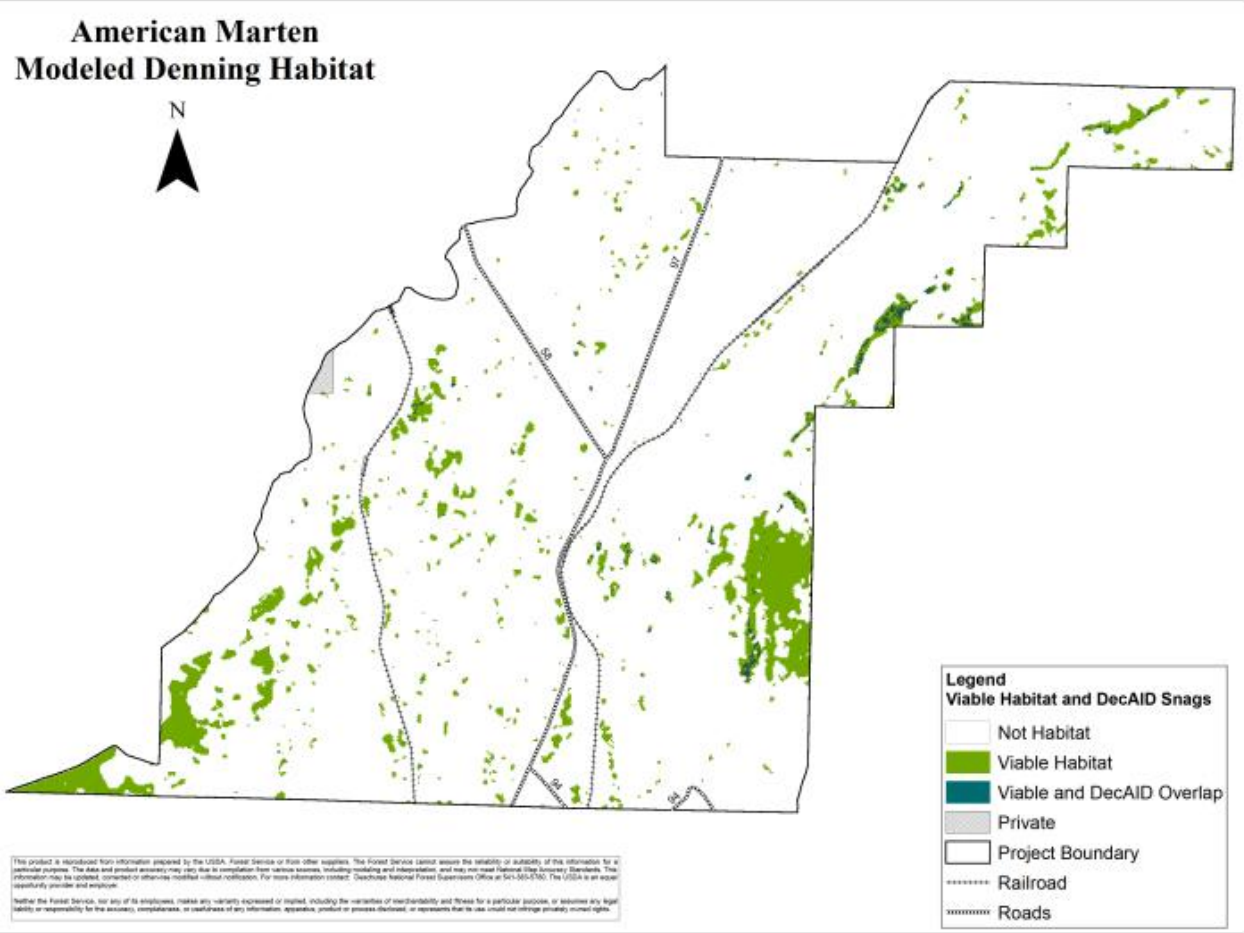



**Figure 9. Potential American Marten Denning Habitat based on the Viable Ecosystem and DecAID Models**

**Table 37. Acres of Potential American Marten Denning Habitat within the Rim--Paunina Project Area (National Forest System Lands Only)**

| American Marten Denning Habitat Acres | | | |
|---|---|---|---|
| **Alternative** | **Pre-Treatment** | **Acres Treated** | **Acres Remaining** |
| **A** | 2,898 | 0 | 2,898 (100%) |
| **B** | 2,898 | 855 (30%) | 2,043 (70%) |
| **C** | 2,898 | 795 (27%) | 2,103 (73%) |
| **D** | 2,898 | 795 (27%) | 2,103 (73%) |
| **E** | 2,898 | 916 (32%) | 1,982 (68%) |

The Crescent Ranger District conducted carnivore surveys on selected areas from 1993-1996 and again in 1998, using bait stations, Trailmaster® cameras, and tracking plates. Numerous photographs of marten and tracks were recorded from these surveys. During the winter of 2010-2011, another carnivore study was completed using bait stations with digital game cameras. Three of the four 2010-2011 stations, which were outside the Rim-Paunina project area, detected American marten. These site stands were comprised of a multistory, open to mid understory, mixed conifer stand. District observation records list 32 reports of marten in the Rim-Paunina analysis area, concentrated on Walker Rim and the southwest

and northwest corner of the project area. Half of the observations were located in mixed conifer forests (15 observations), while the others were observed in lodgepole (11 observations) and ponderosa pine (6 observations) forests. The majority of American marten observations have been in mixed-conifer stands on the Crescent Ranger District.

Figure 10 and Table 38 display projections of suitable marten denning habitat by alternative over time. Again, this is likely an underestimated amount of denning and foraging habitat. Although habitat acres are projected to increase under the no-action Alternative A, the resulting stand left untreated would be more susceptible to infection, infestation, and fire events when compared to the action alternatives. All Action Alternatives acreage amounts increase over time as a result of expected increase in tree vigor from thinning, reducing overcrowded stands, reducing fuel loading, and the probability of advancing stands to the next successional stages. From Table 37 and Table 38, Alternative E treats the most potential nesting habitat (916 acres) and, thus, provides the least amount of acres after implementation (3,406 acres). Alternative C treats 795 acres of potential nesting habitat, but provides the most habitat after year 2018 (4,018 acres), after implementation. The Rim-Paunina project area is not a high source of habitat for martens. Historically, the project area was comprised of predominantly open, single story, ponderosa pine stands with a small mixed conifer component on the upper Walker Rim. Due to over-crowding, a dense multi-layer canopy of ponderosa and lodgepole pine with some mix-conifer is now more common. However, these stands exceed HRV and are at high risk of a stand replacement event. When looking at marten habitat on the whole District, the Rim-Paunina project area is only 13 percent of the Crescent Ranger District. Additionally, the western portion of the Crescent Ranger District has higher amounts of dense, multi-story, mixed conifer forests that are more suitable for marten denning and foraging habitat.

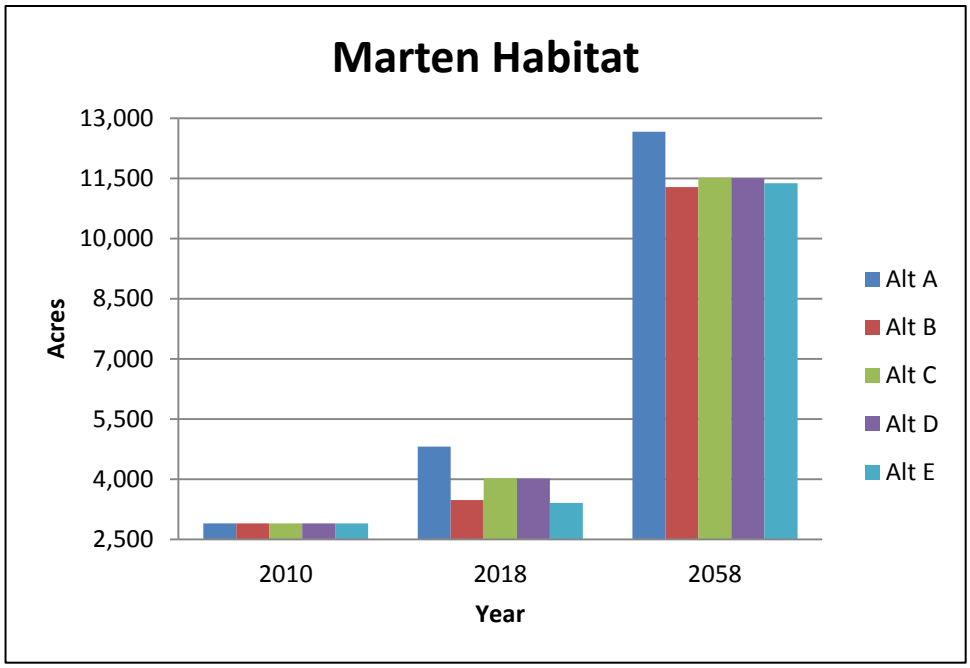



**Figure 10. Viable Ecosystem Modeling Projection of Marten Denning Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 38. Viable Ecosystem Modeling Projection of Marten Denning Habitat Acres over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | American Marten Denning Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| **A** | 2,898 | 4,814 | 12,661 |
| **B** | 2,898 | 3,475 | 11,284 |
| **C** | 2,898 | 4,018 | 11,512 |
| **D** | 2,898 | 4,016 | 11,506 |
| **E** | 2,898 | 3,406 | 11,375 |

The Rim-Paunina project existing condition also includes a 660 foot disturbance zone on all roads and motorized routes. The 660 foot disturbance zone represents existing and potential disturbance from vehicle use on roads and motorized routes (Forman 2000). The assumption is disturbance would continue to effect habitat within the road effect zone (200 meters (~660 feet) each side of roads or motorized trails; Forman et al. 2003).

The 660foot disturbance zone on all roads and motorized routes, including OHV and snowmobile routes, for the existing condition does not affect American Marten within the Rim-Paunina project area. Claar et al. (1999), in Joslin and Youmans (1999) conducted a literary review of potential effects from motorized vehicles on wildlife in Montana, while Zielinski et al. (2007) conducted a research study about snowmobile and OHV effects on martens. From their review, Claar (1999) found no literature of recreation effects on mustelids, but did focus on mortality from trapping and habitat alteration. They found studies suggesting wolverine, fisher, and marten were very susceptible to overharvesting from trapping (Powell 1979; 1982; and Weaver 1993 in Joslin and Youmans 1999). In addition, they hypothesized that recreation trails, especially snowmobile trails, were used by trappers and may increase opportunities for trapping resulting in mortalities. They also hypothesized martens need large home ranges and recreational activities may contribute to habitat fragmentation resulting in isolation in populations (Claar et al. 1999).

Specifically to motorized vehicle effects on martens, Claar et al. (1999) and Zielinski et al. (2007) suggested one reason they do not affect marten is due to daytime operational hours. Martens den or rest in protected shelters during the hours motorized vehicles normally operate. Burskirk (1984) and Maters (1980) found martens stay in resting sites for long periods of time or frequently all day. During the Spencer (1987) study, most martens were found in enclosed sites offering protection from predators and weather, as well as thermoregulation during warmer months (Simon 1980 in Spencer 1987; Buskirk and Ruggiero 1994; Raphael and Jones 1997; Bull and Heater 2000). Martens that were resting in enclosed sites were found to be less prone to flee from humans approaching, and those in subterranean sites never fled (Spencer 1987). These results further concluded in the Zielinski et al. (2007) study that the martens did not seem to be affected by OHV use or noise while martens were in shelters.

Table 39 depicts the denning habitat located within and outside the 660 foot disturbance zone, displayed by year and alternative. For either year (2018 or 2058), there is a nominal difference in undisturbed potential denning habitat acres between alternatives. This is the same for disturbed potential denning habitat. The increase in denning habitat inside and outside the disturbance zone post harvest (year 2018), compared to the current condition, would be a result of habitat stands growing outside of the proposed Rim-Paunina treatment areas. Additively, for year 2058 the increase would also reflect habitat stands exceeding HRV, primarily in ponderosa pine PAG type.

**Table 39. Acres of Denning Habitat Within and Outside the 660 foot Disturbance Zone**

| | Inside 660 foot Buffer | | Outside 660 foot Buffer | |
|---|---|---|---|---|
| | Year | | | |
| **Alternative** | **2018** | **2058** | **2018** | **2058** |
| **A** | 2,063 (43%) | 6,206 (49%) | 2,751 (24%) | 6,455 (31%) |
| **B** | 1,584 (46%) | 5,543 (49%) | 1,891 (26%) | 5,741 (24%) |
| **C** | 1,718 (43%) | 5,634 (46%) | 2,300 (31%) | 5,878 (23%) |
| **D** | 1,716 (43%0 | 5,622 (49%) | 2,300 (32%) | 5,884 (23%) |
| **E** | 1,557 (46%) | 5,554 (49%) | 1,849 (31%) | 5,821 (24%) |

For the state of Oregon, the Oregon State Heritage Program lists the American marten in Oregon as S3/S4 'Vulnerable to Apparently Secure' (NatureServe 2011). NatureServe (2011) stated that for the American Marten in the Pacific Northwest, "habitat conservation measures proposed/implemented for the spotted owl and marbled murlet, and for riparian zones, generally are sufficient to prevent the extirpation of this species, but ongoing management reassessment, monitoring, and adaptive management are important" (U.S. Forest Service et al. 1993; see also Thomas et al. 1993). In addition loss/degradation of habitat due to timber harvest remains a threat to martens in some areas (NatureServe 2011).

## *Environmental Consequences*

### Direct and Indirect Effects

### Alternative A

This alternative would have no immediate direct effect on the American Marten. In the short-term, it is assumed existing habitat would continue to be occupied by marten. In the long-term, because this species tends to select forested stands that have a dense canopy, this characteristic would indicate a greater susceptibility to mistletoe infection, beetle attacks, competition related mortality, and large fire events. Over time, there is a greater potential for some of these forested areas to lose desired denning and nesting character from reduced canopy cover. Conversely, younger-aged stands that have resulted from past management such as regeneration harvest or those that were thinned have the future capability to develop into suitable denning and nesting habitat.

### Effects Common to All Action Alternatives

In Wyoming, California, and Montana marten have been found utilizing dwarf mistletoe shoots as a food source and the brooms as nesting sites or hiding cover (Spencer 1987). However, modeling and district records show their main area of use is in mixed conifer, with some use in lodgepole stands. The known mistletoe-infected sites within the project area are primarily in ponderosa pine stands, so there would be little marten foraging, denning, or hiding use within the infected stands.

The Viable Ecosystem Model estimated there are 2,898 acres of marten denning habitat in the project area. This is based on tree size classes and appropriate Plant Association Groups typically used for denning. The amount of modeled habitat for marten utilization is likely an underestimation for the Rim-Paunina project area. Martens can use denning sites with canopy cover levels down to 30 percent (Raphael and Jones 1997) and forests with lodgepole pine components with tree diameters five inches or greater with dense canopy. The model only mapped habitat in forests with tree diameters of 10 inches or greater, thus underrepresenting habitat in lodgepole forests.

Table 40 displays the range of tolerance intervals based on snag levels taken from DecAID. Figure 9 depicts both the Viable modeled denning habitat and snags, within the 30-80 plus percent tolerance intervals (see Table 40) that overlap providing the highest suitable denning habitat. Essentially, a tolerance level below 30 percent (0-2.8 snags per acre greater than 20 inches in diameter) is habitat that is less suitable for species use than acreage that supports higher levels of snag densities, which is 30 percent and higher with above 80 percent being the most suitable.

Of the 2,898 acres of current modeled denning habitat, 1,767 acres (61 percent) does not have snags greater than 20 inches in dbh and is unlikely to support denning females. For the 0 to 30 percent tolerance interval, there are 976 acres (34 percent of modeled habitat) of which there are 0 to 2.8 snags per acre that are 20 inches in dbh and larger. This snag density could support denning females, though it is not as likely as higher tolerance intervals. At the 30 to 50 percent tolerance interval, 134 acres (5 percent of modeled habitat) meets or exceeds the DecAID snag densities of 2.8-7.7 snags per acre, which is required for suitable denning habitat (Mellen-McLean 2009). For the 50 to 80 percent tolerance level, 21 acres (1 percent of modeled habitat) exceeds the required, 7.7-15.2 snags per acre, resulting in a higher likelihood denning females would use the current modeled habitat. There are no snags which fall in the 80 plus percent tolerance interval of the modeled denning habitat. For the existing condition, the majority of modeled snag denning habitat falls within the tolerance level which is not as likely to support denning females.

However, this is likely an underestimation of snag levels in denning habitat because data used to model snag tolerance levels within the project area are not current. It is assumed there has been snag recruitment since the data was captured and since the data was modeled for the Rim-Paunina project area analysis. Additionally, martens utilize other structures for denning habitat, not just snags. Raphael and Jones (1997) found marten denning sites in their Oregon study included live trees (35 percent), logs (32 percent) and slash piles (29 percent).

Project Design Features in Chapter 2 of this document disclose the retention of snags and limited circumstances where snag felling may occur. For down wood, another usable source of denning habitat, the Project Design Features state to retain down wood and limit down wood removal, including removal within potential fire wood units. Other Project Design Features include retaining high value trees for wildlife on the site (e.g. live multiple topped trees, true firs with conks, etc). Additionally, prescribed burn plans developed after timber harvest activities are completed may include a request to create additional snags from burning where snags are currently limited for protection of existing snags. For down wood, prescribed burn plans would also include the retention of larger dead wood 12 inches in diameter and greater.

**Table 40. American Marten Intervals and Snag Use**

| **American Marten 2,898 acres** | **Density of Snags = 20" dbh by tolerance interval** | | | | |
|---|---|---|---|---|---|
| Tolerance Interval* | 0% | 0%-30% | 30%-50% | 50%-80% | 80%+ |
| Density (no./hectare*) | 0 | 0-6.9 | 6.9-19.3 | 19.3-37.9 | 37.0+ |
| Density (no./acre*) | 0 | 0.2.8 | 2.8-7.7 | 7.7-15.2 | 15.2+ |
| Percent of Habitat | 61% | 34% | 5% | 1% | 0% |
| Acres | 1,767 | 976 | 134 | 21 | 0 |
| *From DecAID 2.1 Tables EMC_S/L.sp 22 and PPDF_S/L.sp-22. Information synthesized from various studies. Species utilizing high snag densities are generally utilizing clumps of snags. | | | | | |

All action alternatives propose a combination of commercial thinning harvest, non-commercial thinning and post-sale activities that may include grapple piling of slash, pile burning, underburning, and commercial and/or personal use firewood removal within stands currently defined as marten denning habitat. It is assumed that following completion of timber harvest, associated post-sale work, and fuels only units, canopy cover would probably be below the levels described as denning habitat for this species. Within the lodgepole pine Plant Association Group, post-harvest canopy cover is estimated to be 20-25 percent, with 30-35 percent cover for the mixed conifer and mountain hemlock Plant Association Group. A Raphael and Jones (1997) study in lodgepole pine forests concluded that denning sites averaged 30 percent canopy cover. This level of canopy cover is not expected to be achieved post-harvest in lodgepole pine for approximately 2-3 decades, but may be reached within the mixed conifer PAG - although the Raphael et al. (1997) study did not include mixed conifer stands in Oregon. In the long-term, reduction of competition would accelerate tree growth and allow multiple canopies to become fuller, providing structure that would benefit marten, where these stands exist.

Regardless of the PAG being affected, there would be a reduction in canopy cover, resulting in less physical structure near the ground that contributes to protection from avian predation. In addition, in areas where firewood removal may occur (Alternative B, C, and D units: 10, 15, 20, 155, 160, 166, 190, 370, 385, 425, 430, and 870; Alternative E units: 15, 20, 150, 155, 160, 166, 190, 370, 385, 425, 430, and 870) and which overlap with marten denning habitat, there would be changes in the amount and likely distribution of down wood. These are the only treatment units where dead and down wood may be removed.

Removal of dead and down would reduce cover habitat for marten prey species such as squirrels, chipmunks, and voles with a corresponding decrease in prey densities. It would also reduce the likelihood these stands would be used as a denning or resting site. Bull and Blumton (1999) conducted a study in the Blue Mountains of Oregon of fuels reduction on marten and their prey within lodgepole pine and mixed conifer stands. With the prescriptions that were applied for harvest and retention of live trees, standing dead, and down wood removal, they concluded it resulted in a reduction in densities of red-backed voles and snowshoe hares. It also increased chipmunk populations, although chipmunks hibernate in winter and represented less than three percent of marten diets in this study area. Bull and Blumton (1999) determined there was no change in squirrel numbers in mixed conifer harvest where one-acre islands are retained in a passive management scenario. This indicates these types of activities continue to

provide suitable habitat. They also placed radio collars on martens in the area. The martens avoided all stands with less than 50 percent canopy cover, contrary to the Raphael and Jones study on an adjoining forest that determined marten would use denning sites with canopy cover levels down to 30 percent. Bull and Blumton (1999) also found that the radio-collared marten did not use any stands that had been harvested with the following caveat: "The harvested stands, however, comprised such a small proportion of the marten's home range that this behavior could not be construed as an avoidance of harvested stands." Bull and Blumton (1999) do not recommend extrapolating the data beyond this study area because the numbers of animals captured was low and the sampling period was short.

To partially lessen the effects of thinning live trees and removal of down wood in harvest areas or fuels treatment units, down wood would be retained to the levels described in the Project Design Features specified in Chapter 2. Where firewood removal would occur, Project Design Features have been incorporated to specify minimum levels. The tonnage per acre to be retained would range from 12-20 in ponderosa pine type plant association group (PAG). This equates to 11-16 whole trees 16-22 inches in diameter or equivalent, or 2.8-5.2 percent down wood cover. For lodgepole pine PAG type 7-42 tons/acre would be retained. This equates to 17-105 whole trees 8-12 inches in diameter or equivalent, or 2.6-15.9 percent down wood cover. For montane mixed conifer stands (mountain hemlock) PAG type 11-42 tons/acre would be retained. This equates to 11-38 whole trees 16-22 inches in diameter or equivalent, or to 2.6-10 percent down wood cover. Monitoring of the woodcutting areas is standard practice on the District and would determine when these levels have been reached. When this occurs, woodcutting areas would be closed down. In addition, snags would be retained except where felled for occupational safety, log landings and where temporary roads would be located. These measures, in addition to the 15 percent of each harvest and fuels unit retained in a passive management scenario, would continue to provide a prey base for martens within units of activity.

**Direct and Indirect Effects**
**Alternative B**
This alternative would result in 855 acres of treated denning habitat within Rim-Paunina project area. Management treatments for these acres include commercial and non-commercial thinning, slash removal, and prescribed underburning, which would be conducted in ponderosa pine dominated stands. All of these activities, in the short term, can decrease prey base habitat. For those treatment units that reduce canopy cover into the 20-25 percent post-harvest range, the acres are assumed to be unsuitable for denning purposes in the short-term, particularly those in the lodgepole pine PAG. Alternative B treatment units would primarily focus on the ponderosa pine PAG, returning stands back to HRV. Single-story open ponderosa pine PAG is not American marten denning habitat. However, there are treatments in lodgepole and mixed conifer stands where this condition may last several decades or more until canopy cover increases and existing snags fall, thus increasing the amount of coarse woody debris. Through Rim-Paunina management activities, canopy cover for all PAGs would create a more resilient habitat and over time increase denning habitat in those PAGs conducive to American marten habitat (Table 38). However, in year 2058 these forest conditions may exceed HRV without re-entry.

This alternative would allow temporary construction of 9.2 miles of road to facilitate efficient harvest, the most miles of any action alternative. This would allow a temporary increase in area available for trappers to pursue furbearers, including marten during regulated fall and winter trapping season. These roads could also temporary provide predators increased access to marten habitat.

As with all action alternatives, there would be at least 15 percent retention of passively managed acres and dead and down retentions, the standard for mitigation measures (Chapter 2), in all treatment units. Based on the habitat definition all action alternatives would result in at least 68 percent of American marten denning habitat remaining unmanaged, not including the 15 percent retention (Reference Table 37).

**Direct and Indirect Effects**
**Alternative C and D**
Alternatives C and D were designed to provide a balance, both short and long-term, between those MIS that prefer open ponderosa stands and those that favor a denser, multi-layered stand, like the American Marten. Alternatives C and D provide the most habitat and have the least amount of habitat within proposed treatment units, 795 acres (60 acres less than Alternative B). Management treatments for these acres include commercial and non-commercial thinning, slash removal, small diameter thinning, mastication, and prescribed underburning. Effects are similar to those described for Alternative B, only applying to a lesser number of acres.

Alternative D management activities also include group selection in severely dwarf mistletoe infected stands, creating 2-5 acre openings with removal of all infected trees including those over 21 inches in diameter, and planting ponderosa pine seedlings in the openings. Activities are proposed to break the dwarf mistletoe cycle of continual infection by creating openings and planting uninfected ponderosa pine. It is unlikely, but if these pockets of infectious stands also include lodgepole pine the trees may be used as denning habitat (Spencer 1987). However, most studies show American Marten use high elevations areas with mix-conifer forests as denning habitat (Raphael and Jones 1997, Ruggiero et al. 1994). Additionally, if left untreated, the current mistletoe infection would reduce tree vigor, possibly resulting in tree mortality, and increase the risk of a stand replacement event.

Alternative D management activities would remove more of the over-story needed for suitable Marten habitat, but would also over time increase catastrophic event resistance of habitat. Over time there would be an increase in canopy density along with snags and trees falling, resulting in more conducive habitat.

Additionally with Alternatives C and D, no activity would occur in select decadent lodgepole pine stands. Passive management activities, including the 15 percent retention in all units and the dead and down, would provide more disturbance resistant, contiguous habitat for denning marten with all action alternatives.

Both alternatives would allow for the least amount of temporary road construction, 6.5 miles, facilitating efficient harvest. Effects of temporary road construction are similar to those discussed in Alternative B, only on a lesser number of miles.

**Direct and Indirect Effects**
**Alternative E**
Alternative E activities would result in 916 acres of treated denning habitat, 61 more treated acres than Alternative B and 121 acres more that Alternatives C and D. Management treatments are similar to Alternative B, but also include the creation of varying sized openings of infected trees under 21 inches in diameter, with inducing mortality in trees over 21 inches in severely mistletoe-infected stands. Other management activities include slash removal, small diameter thinning, mastication, and prescribed underburning, which would be conducted in primarily ponderosa pine dominated stands. Effects are similar to those described for Alternative B, only applying to a lesser number of acres. Like Alternative D, Alternative E also reduces more canopy cover by inducing mortality in severely infected trees 21 inches and over. However, those trees would be left in the units and recruited into snags or coarse woody debris.

This alternative would allow temporary construction of 8.3 miles of road to facilitate efficient harvest. Effects of temporary road construction are similar to those discussed in Alternative B, only on a lesser number of miles.

**Cumulative Effects**
Table 19 was reviewed for past, present or foreseeable actions that have potential to intensify effects to the marten. The zone of influence is defined as the 40,000 acre Little Walker Watershed, because it is large enough to encompass multiple female home ranges based on home range data from Raphael and Jones (1997). Viable Modeling has accounted for all active management that has occurred prior to December 2011. There are no projects which overlap with the Rim-Paunina project area.

The small amount of private land, 106 acres, in the Rim-Paunina project area is not likely marten denning habitat because of development and would not become suitable habitat in the future. Adjacent to the project area is the new Gilchrist State Forest that totals approximately 43,235 acres. At the present time it is not likely providing much marten denning habitat due to intensive timber harvest that has occurred over the last decade. Future marten habitat suitability would depend on forest management prescriptions and stated objectives would "maintain the forestlands as managed/working forests and conserve forestlands that could be lost to parcelization and/or development." [18] Activities would focus on developing an integrated management plan for recreation, sustainable forestry and wildlife habitat. Forest management activities would match the Eastern Oregon Regional Forest Management Plan which would likely thin overly dense young forests in the first decade. This change in objective can only be hypothesized to improve future marten habitat, but because of the early stage of the acquisition, it is not possible to quantify how much and when.

Since there are no overlapping projects, no cumulative effects to the American Marten are projected for the Rim-Paunina project area.

**Conclusion**
For the state of Oregon, the Oregon Natural Heritage program lists martens as S3/4 'Vulnerable to Apparently Secure', (NatureServe 2011). Habitat modeling of Rim-Paunina management activities shows an increase in the amount of denning habitat overtime (Table 38). The increased denning habitat would be healthier, as well as more resilient to infestation, infection, and fire events. However, by year 2058 the increased habitat would lead to stands exceeding HRV, once again increasing risk of a stand replacement event. Re-entry would need to occur to keep stands at HRV in some units. These units would be primarily ponderosa pine PAG types, which are not conducive to denning marten.

Project mitigation measures of retaining at least 15 percent of undisturbed habitat and retaining dead and down wood within treated acres, as well as untreated lands, allow for blocks of unmanaged stands suitable for denning habitat. These blocks would help maintain American marten populations within the Rim-Paunina project area and on the Crescent Ranger District. The project area only affects a small portion, 13 percent, of the district that is mainly comprised of ponderosa and lodgepole pine stands, not the high elevation mixed-conifer stands preferred by Marten. The majority of suitable denning habitat is outside the Rim-Paunina project area; inside during implementation only 2,898 acres of denning habitat would be affected. Additionally, there are no other ongoing or currently proposed projects that overlap with the Rim-Paunina area. Therefore, there are no projects that would decrease the American Marten population within the project area or Crescent Ranger district.

Recent Deschutes National Forest analysis shows there are 433,973 acres of modeled denning habitat for the American marten. This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on district there are no cumulative effects. The project area is 13 percent of the entire Crescent Ranger District, which is only 22 percent of the Deschutes National Forest. There is

[18] State of Oregon Staff Analysis of the Proposed Acquisition, November, 2009

ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the American marten.

**Sharp-shinned and Cooper's Hawks**

**Ecology**

Sharp-shinned and Cooper's hawks are both ranked S4, 'Apparently Secure' in the state of Oregon (NatureServe 2011). For sharp-shinned hawks small declines may be attributed to loss of preferred young dense forest stands in boreal forest due to logging, and pesticides (NatureServe 2011). The use of pesticides on farmlands and loss of habitat are the major threats for Cooper's hawks (NatureServe 2011).

Both species are closely associated with deciduous and mixed coniferous forests and riparian woodlands. They can occur in large forests but are also found near forest edges and clearings near lakes or streams. In a study in eastern Oregon, Reynolds (1983) found nesting sharp-shinned hawks use 25-50 year-old even-aged conifer stands while Cooper's hawks used 30-70 year old even-aged conifer stands with somewhat larger and more widely spaced trees than those stands used by sharp-shinned hawks. Reynolds also reported the mean distance between the nearest nesting neighbors was 4.1 km (2.5 miles) for sharp-shinned hawks and 4.7 km (2.8 miles) for Cooper's hawks. Both species are adapted to catch avian prey but each would also capture small mammals, lizards, and various large insects and amphibians (Johnsgard 1990). Home range estimates were 1,590 hectares (3,975 acres) for Cooper's hawks and 460 hectares (1,150 acres) for sharp-shinned hawks in Oregon (Reynolds 1983). Reynolds (1983) studied accipiter nest sites in eastern Oregon and determined the mean canopy cover for sharp-shinned nests was 68 percent and 64 percent for Cooper's hawks, although the range extends from 20-95 percent for sharp-shinned hawks and from 15-100 percent for Cooper's. Both species select nest placement well up in the tree canopy for nest concealment or shading during warm temperatures (Moore and Henny 1983; Reynolds et al. 1983). Dense vegetation provides screening cover and physical protection from predators and predation may account for the high foliage density in the immediate vicinity of the nests of sharp-shinned and Cooper's hawks (Reynolds et al. 1983).

**Existing Condition**

The Viable Ecosystem model was used to estimate acres of suitable nesting habitat for the Cooper's and sharp-shined hawks (Figure 11). Modeling for Cooper's hawk habitat is lodgepole, ponderosa, dry to moist Douglas fir, dry to moist grand fir, white fir, mountain hemlock, silver fir, and dry white bark pine stands that have a dense canopy, trees 10 inches in diameter and higher, and early to late seral stages. Modeling for sharp-shinned hawk habitat is lodgepole, ponderosa, dry to moist Douglas fir, dry to moist grand fir, white fir, dry sub alpine fir, Shasta red fir, mountain hemlock, and dry white bark pine stands that have a dense canopy, trees 10 inches to 20 inches in diameter, and early to mid seral stages. There is considerable overlap of habitat for each species and habitat is generally well distributed across the entire project area with the exception of the young plantations, meadow complexes, and rock outcrops. For the Deschutes National Forest, potential nesting habitat was modeled resulting in 275,340 acres for Cooper's hawks and 426,138 acres for sharp-shinned hawks. This nesting habitat is scattered in lodgepole pine, ponderosa pine, dry to moist Douglas fir, dry to moist grand fir, white fir, mountain hemlock, silver fir, and dry white bark pine, dry sub alpine fir, Shasta red fir, mountain hemlock PAG types across the three districts.

For Rim-Paunina, the modeling datasets used for canopy closure class, stand structure class, PAG, and species are datasets from 2009. All timber sales, fuel reduction activities, natural disturbance events such as wildfire, and vegetation activities on private lands within the Rim-Paunina analysis area were included in this information. All activities that occurred after 2004 and their potential incremental effects within the Rim-Paunina area are discussed further in the cumulative effects section.

There are approximately 1,985 acres of potential nesting habitat for the sharp-shinned hawk and 5,439 acres for the Cooper's hawk in the Rim-Paunina project area. These figures account for all past and present timber sales, natural events such as wildfires, and any other habitat altering activity. This acreage is generally well distributed on National Forest system lands across the analysis area. For Cooper's and sharp-shinned hawks, the majority of potential habitat is concentrated around Walker Rim, but scattered throughout the analysis area.

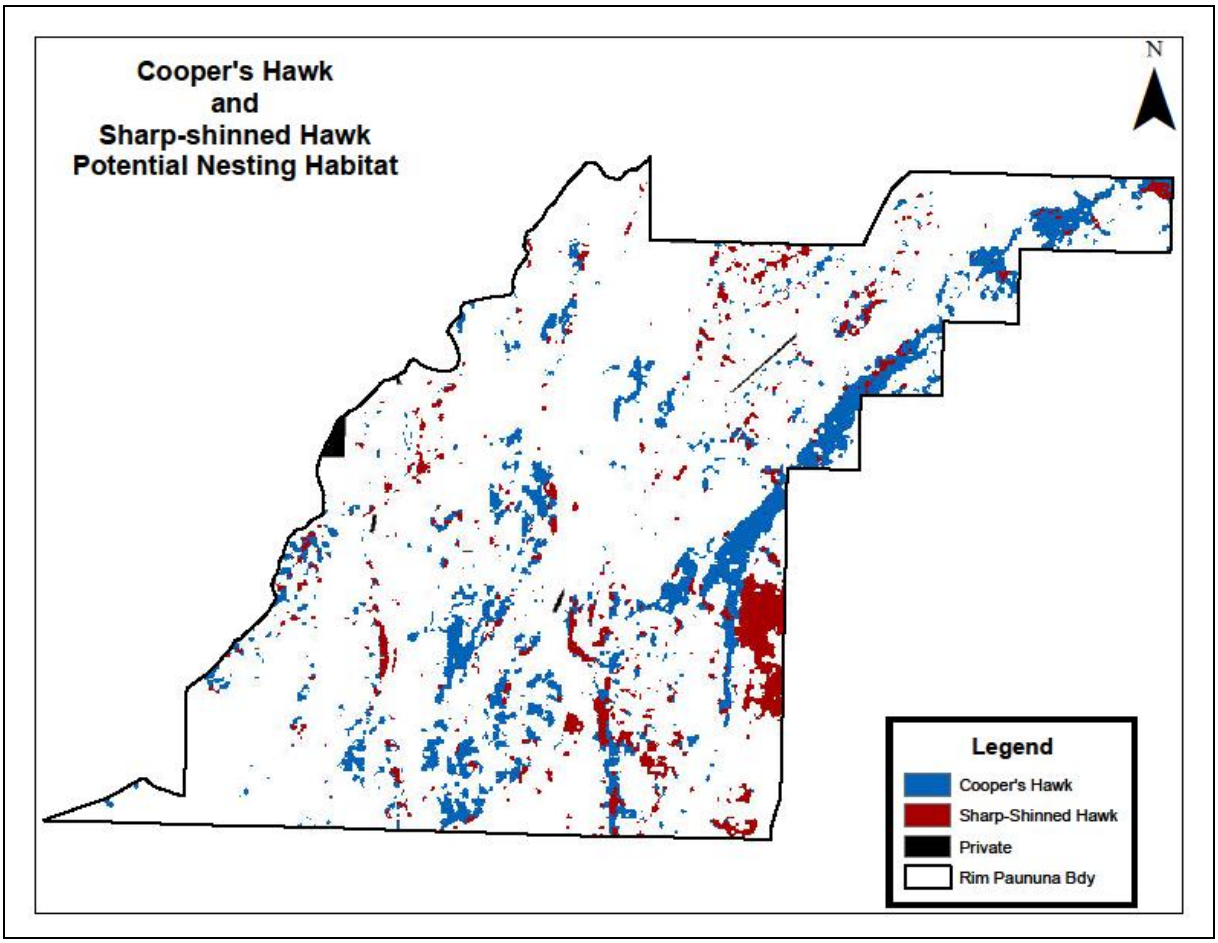



**Figure 11. Potential Cooper's and Sharp-shinned Hawk Nesting Habitat Based on the Viable Ecosystem Model**

The district wildlife sighting database lists eleven sightings and one nest, discovered in 1998, for Cooper's hawks. The nest is approximately one mile east of Highway 97 by Little Walker Mountain, but sightings occur throughout the analysis area. While there are four recorded sharp-shinned sightings including one near Odell Butte, one near Bunny Butte, and two in the most eastern portion of the analysis area, there are no documented sharp-shinned nests within the analysis area. The only known sharp-shinned nest is east of Big Marsh, recorded in 2006, and outside the project area. The sightings came from general observations during other forest management activities as well as during surveys for northern goshawks. There is considerable overlap of habitat for each species and habitat. Formal surveys have not been conducted for either species and reported observations are the results of random observations and responses from conducting northern goshawk surveys.

Table 41 summarizes the effects of proposed management activities on existing goshawk habitat in the Rim-Paunina project area by alternative. The 'Acres Remaining' column is assumed potential nesting habitat acres once project implementation is completed in 2018. Alternative E for both Cooper's and sharp-shinned hawk treats the most habitat acres with project implementation. The percent difference between all action alternatives is nominal, except for Alternative B, which treats the fewest acres in nesting habitat.

**Table 41. Acres of Potential Cooper's and Sharp-shinned Hawk Nesting Habitat within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Cooper's Hawk Nesting Habitat Acres | | | Alternative | Sharp-shinned Nesting Habitat Acres | | |
|---|---|---|---|---|---|---|---|
| | Pre-Treatment | Acres Treated | Acres Remaining | | Pre-Treatment | Acres Treated | Acres Remaining |
| **A** | 5,439 | 0 | 5,439 (100%) | **A** | 1,985 | 0 | 1,985 (100%) |
| **B** | 5,439 | 1,573 (29%) | 3,866 (71%) | **B** | 1,985 | 478 (24%) | 1,507 (76%) |
| **C** | 5,439 | 2,598 (48%) | 2,841 (52%) | **C** | 1,985 | 745 (38%) | 1,240 (62%) |
| **D** | 5,439 | 2,598 (48%) | 2,841 (52%) | **D** | 1,985 | 745 (38%) | 1,240 (62%) |
| **E** | 5,439 | 2,697 (50%) | 2,742 (50%) | **E** | 1,985 | 777 (39%) | 1,208 (61%) |

The Rim-Paunina project existing condition also includes a 660 foot disturbance zone on all roads and motorized routes. The 660 foot disturbance zone represents existing and potential disturbance from vehicle use on roads and motorized routes (Forman et al. 2003). The assumption is disturbance would continue to effect habitat within the road effect zone (200 meters (~660 feet) each side of roads or motorized trails; Forman et al. 2003). Decreased habitat quality, reduced reproductive potential, and avoidance of the roads and motorized routes effect zones are potential effects as a result of physical habitat alteration or due to disturbance.

There is conflicting science when assessing the human disturbance effects on raptors. Gunnison National Forest Travel Management Plan, USDA (2001) and Hamann et al. (1999) suggested in both their literature reviews that sensitivity occurs near nest sites and mainly effects eggs or young. Direct activities, such as noise from vehicles, could disturb these species during nesting and foraging and may negatively affect them. USDA (2001) and Hamann et al. (1999) found prolonged disturbance during nesting season may result in nest and young abandonment and increased stress levels. Alternatively, other studies have found that walking straight to a birds' nest (including raptors) is more disruptive than vehicle or OHV use (Lee 1981; Skagen 1980; Holmes et al. 1993; Burger and Gochfeld 1998 pages 151, 220, 222 and 223; Gill et al. 1996). Lee (1981) found that female hawks did not flush from nests when motorcycles passed by. These and other occasions are examples why Lee (1981) concluded hawks may become habituated to moving machines. In addition, Lee (1981) also stated hawks may tolerate "disturbances", hikers, snowmobiles, motorcycles, and horseback riders, so they can keep territories that meet resource needs.

Raptors have been known to use small two-track roads and trails that experience low use and have existing canopy cover on the sides as foraging habitat (Flecher at al. 1999; St. Pierre 2008). Some avian

scavengers prefer to use these types of open areas because vegetation may hide potential predators while they are feeding (Skagen et al. 1991).

Table 42 and Table 43 list the amount of Cooper's and Sharp-shinned hawk nesting habitat within and outside the disturbed zone. For both species Alternative A, the no-action alternative, leads to the most habitat acres, but also creates the greatest amount of risk for stand replacing events. Over time the Rim-Paunina project area potential nesting habitat becomes more prevalent both inside and outside the disturbance zone under all alternatives. Alternative D provides the most potential nesting habitat outside the disturbance buffer zone in year 2058, while Alternative B provides the least. However, the difference between each action alternative proposed potential nesting habitat, whether within or outside the disturbance zone, is nominal. There are no project implementations that would change the size of the disturbance zone.

**Table 42. Acres of Cooper's Hawk Nesting Habitat Inside and Outside the 660 foot Disturbance Buffer**

| Cooper's Hawk | Inside 660-foot Buffer | | Outside 660-foot Buffer | |
|---|---|---|---|---|
| | Year | | | |
| **Alternative** | **2018** | **2058** | **2018** | **2058** |
| **Alt A** | 3,442 (47%) | 10,594 (52%) | 3,649 (52%) | 9,666 (47%) |
| **Alt B** | 2,564 (44%) | 8,432 (51%) | 3,280 (56%) | 8,023 (49%) |
| **Alt C** | 2,610 (44%) | 8,801 (51%) | 3,305 (56%) | 8,610 (49%) |
| **Alt D** | 2,555 (44%) | 9,025 (51%) | 3,262 (56%) | 8,829 (49%) |
| **Alt E** | 2,414 (44%) | 8,236 (50%) | 3,105 (56%) | 8,100 (49%) |

**Table 43. Acres of Sharp-shinned Hawk Nesting Habitat Inside and Outside the 660 foot Disturbance Buffer**

| Sharp-Shinned Hawk | Inside 660-foot Buffer | | Outside 660-foot Buffer | |
|---|---|---|---|---|
| | Year | | | |
| **Alternative** | **2018** | **2058** | **2018** | **2058** |
| **Alt A** | 1,079 (48%) | 5,576 (54%) | 1,189 (52%) | 4,663 (46%) |
| **Alt B** | 852 (45%) | 4,483 (55%) | 1,041 (55%) | 3,641 (45%) |
| **Alt C** | 871 (45%) | 4,621 (53%) | 1,058 (55%) | 4,117 (47%) |
| **Alt D** | 846 (45%) | 4,863 (53%) | 1,049 (55%) | 4,351 (47%) |
| **Alt E** | 803 (44%) | 4,734 (54%) | 1,010 (56%) | 4,100 (46%) |

For Alternatives C, D, and E Unit 945, a 'Fuels Only' maintenance burn unit, is within a quarter mile of a known Cooper's hawk nest. Seasonal restriction would apply April 1st –August 31st for all implementation activities that would disturb the hawks, if the nest is found active (Chapter 2).

## *Environmental Consequences*

**Direct and Indirect Effects**

**Alternative A**

The selection of this alternative would have no immediate direct effect on sharp-shinned and Cooper's hawks. In the short term, the existing territories would likely continue to be occupied by nesting pairs. Undiscovered pairs if present in the project area would also be unaffected by vegetation management actions. However, in the long-term, without treatment overcrowding and competition in stands would lead to an increased mortality level in large diameter trees, which is evident now. Overcrowding conditions in stands also elevate mistletoe infection and beetle infestation resulting in reduced tree vigor, which can lead to premature death and an increase in fuel loading resulting in more chances of forest fires.

Many forested stands are still at risk of catastrophic wildfire events similar to the Davis Fire, which resulted in the long-term loss of over 16,000 acres of suitable habitat. Alternative A would not allow for over and understory tree removal, underburning to reduce fuel loadings, stand competition to maintain desired late- and old structural habitats closer to historical levels across the project area, or improvement of stand health. The combination of insect, disease, and fire events would compound the long-term loss of nesting habitat.

Over time, Alternative A has the greatest potential for stands to lose their desired nesting character from reduced canopy cover as a result of mortality from a disturbance event. Conversely, younger aged stands that have resulted from past regeneration timber harvest have the capability to develop into suitable nesting habitat because these species would use relatively small diameter trees for nesting purposes.

**Effects Common to All Action Alternatives**

The Cooper's hawk and sharp-shinned hawk are closely associated to mixed conifer and deciduous forests and riparian woodland. The majority of Rim-Paunina proposed treatments are in lodgepole pine, ponderosa pine, and pine dominated mixed conifer forests, with only 43 acres of treatments in aspen stands. The proposed project would only treat a small portion of nesting habitat for both Cooper's and sharp-shinned hawk. In the short-term these treatments may render portions unusable for nesting habitat, but would still function as foraging habitat post-harvest for both species.

Table 41 displays the acres of potentially suitable nesting habitat for both accipiters for each proposed alternative over time. Although habitat acres are projected to increase under Alternative A, the resulting stand left untreated would be more susceptible to infection, infestation, and fire events when compared to action alternatives. Action Alternative acreage amounts increase over time as a result of expected increase in tree vigor from thinning, reducing overcrowded stands and fuel loading, and the probability of advancing stands to the next successional stages.

Modeled potential nesting habitat acres for all action alternatives are similar over time (Table 44 for Cooper's hawk and Table 45 for sharp-shinned hawk). In 2018, Alternative C, for both species, the Rim-Paunina implementation analysis modeled the most acres of nesting habitat. From Table 41, Table 44, and Table 45, Alternative E treats the most potential nesting habitat (2,697 acres for Cooper's hawk; 777 acres for sharp-shinned hawk) and provides the least amount of acres after implementation (5,519 acres for Cooper's hawk; 1,813 acres for sharp-shinned hawk). Alternative C treats 2,598 acres of potential nesting habitat for Cooper's Hawk and 745 acres for sharp-shinned hawk, but provides the most habitat after year 2018 (5,915 acres for Cooper's hawk; 1,929 acres for sharp-shinned hawk), after implementation. However, the difference between acreage treated for Alternatives C, D, and E is minimal. In year 2058, Alternative D, for both species, modeled the most potential nesting habitat. The difference in acreage of potential nesting habitat modeled for all action alternatives after implementation

is also minimal. The increased potential habitat in 2058 may result in some ponderosa pine and some mixed-conifer stands exceeding HRV. Without treatment re-entry before 2058, density in stands would continue and exceed HRV.

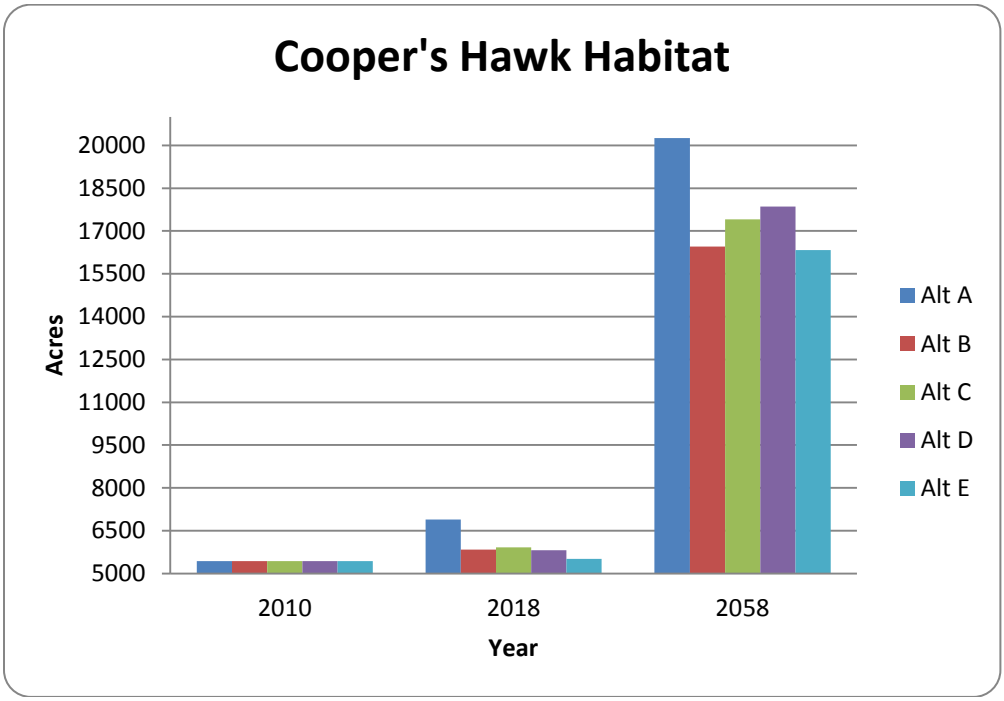



**Figure 12. Viable Ecosystem Modeling Projection of Cooper's Hawk Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 44. Viable Ecosystem Modeling Projection of Cooper's Hawk Nesting Habitat Acres over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Cooper's Hawk Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| **A** | 5,439 | 6,891 | 20,260 |
| **B** | 5,439 | 5,844 | 16,455 |
| **C** | 5,439 | 5,915 | 17,411 |
| **D** | 5,439 | 5,816 | 17,854 |
| **E** | 5,439 | 5,519 | 16,336 |

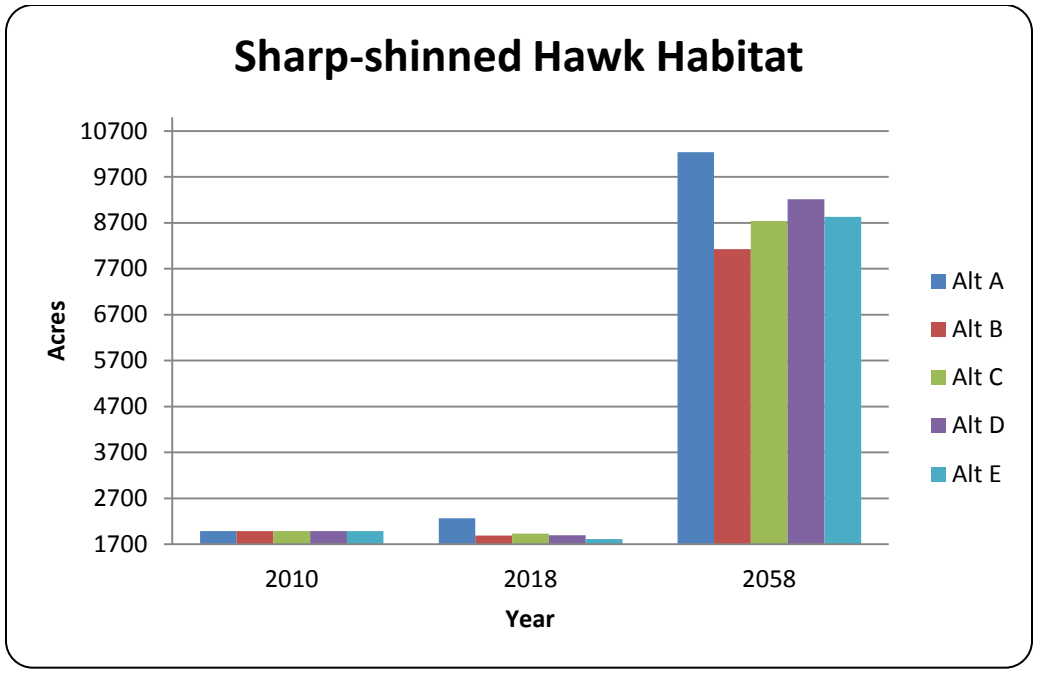



**Figure 13. Viable Ecosystem Modeling Projection of Sharp-shinned Hawk Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 45. Viable Ecosystem Modeling Projection of Sharp-shinned Hawk Nesting Habitat Acres over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Sharp-shinned Hawk Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| A | 1,985 | 2,268 | 10,239 |
| B | 1,985 | 1,893 | 8,124 |
| C | 1,985 | 1,929 | 8,738 |
| D | 1,985 | 1,895 | 9,214 |
| E | 1,985 | 1,813 | 8,834 |

While project activities would reduce the amount of potential nesting acreage for each species, Reynolds et al. (1983) noted that nest sites contain the appropriate vegetative structure for a limited number of years and that turnover of nest sites must be accounted for. Within the Rim-Paunina analysis area, at least 50 percent (Table 41) of potentially suitable nest habitat for all action alternatives would be maintained in an unmanaged condition capable of providing nest habitat, not including the at least 15 percent retention of passively managed acres in each treatment unit. Within activities in mixed conifer and lodgepole pine PAGs, suitable nesting conditions may return overt ime as canopy cover returns to a desired nesting level, particularly for Cooper's hawks which can tolerate a more open condition. In the event an active nest is discovered, Project Design Features (Chapter 2) designate an unthinned clump around each nest site and place seasonal restrictions as needed to prevent disturbance to nesting pair(s).

The retention of at least 15 percent as untreated acres may be enable the provision of a stand for Cooper's and/or sharp-shinned hawks where appropriate structure exists. Because well distributed nesting habitat is available to function as future replacement, there would be no reduction in the numbers of either species' home ranges that can be supported across the analysis area. In addition, there would be no loss of Late and Old Structured habitat because the largest trees would be retained, expect in alternative D where some trees over 21 inches would be removed to address mistletoe infection. Within younger-aged stands, reduced competition for scarce resources as a result of thinning would allow the residual trees to increase their size potential. Also, management practices would encourage development of a more resilient forest (e.g. reducing the risk of disease, infestation, and fire events in nesting habitat).

All action alternatives are consistent with recommendations by Reynolds et al. (1992) to reduce small tree densities to improve foraging habitat and increase the growth of residual trees. Activity units that maintain below 64 percent canopy cover for Cooper's hawk and below 68 percent canopy cover for sharp-shinned hawk would convert to foraging habitat. However, the canopy cover for both species have a wide range of tolerance, 20-95 percent for sharp-shinned hawk and 15-100 percent for Cooper's hawk (Reynolds et al. 1982). Ponderosa pine PAG types may continue to function as foraging habitat due to maintaining HRV through re-entry.

Table 42 and Table 43 show the amount of potential nesting habitat for the Cooper's and sharp-shinned hawk within and outside the disturbance zone. Regarding both species, the potential nesting habitat acreages for all action alternatives increase over years 2018 and 2058 and is evenly scattered throughout the Rim-Paunina area. However, in year 2058, increased potential nesting habitat may be from stands exceeding HRV. Decreased habitat quality, reduced reproductive potential, and avoidance of the roads and motorized trails effect zones are potential effects as a result of habitat alteration physically or due to disturbance. There is no proposed road opening or closing with project implementation. As in all alternatives, the utilization of habitat for nesting within the disturbance zone may be unlikely. Science is conflicted on whether some habituation or tolerance occurs (Lee 1981), or whether any human disturbance, motorized or other, can affect the nest (USDA 2001 and Hamann et al. 1999).

All understory removal would result in the reduction of some habitat for prey species in the short term. In the long term, the understory will regrow providing habitat for prey species again. The exception is where maintenance burning is prescribed on an 8-15 year cycle, and vegetation is assumed to be reduced.

In proposed thinning units, snags are not designated for removal except in hazardous circumstances, thus not disturbing snags and coarse woody debris that would be available for Cooper's and sharp-shinned hawk prey base habitat. In addition, 15 to 20 percent of each proposed unit would be managed in a passive scenario.

For Alternatives C, D, and E Unit 945, a 'Fuels Only' maintenance burn unit, is within a quarter mile of a Cooper's hawk nest. If the nest is found active, a seasonal restriction from April 1st -August 31st would be implemented project design features in Chapter 2.

**Direct and Indirect Effects**

**Alternative B**

Implementing Alternative B would result in management activities in 1,573 acres (29 percent) of Cooper's and 478 acres (24 percent) sharp-shinned hawk nesting habitat in the project area; the least amount of treatment for action alternatives. Management activities propose to develop, maintain, and enhance late- and old structured stand characteristics suitable for certain MIS habitat, like the white-headed woodpecker and other ponderosa pine dependent species. This would include using prescribed fire to return fire-dependent stands back to a more natural state (i.e. an open, single story stand with little brush component). Proposed project treatments include commercial thinning of 12,036 acres.

Additionally, this alternative includes 3,530 acres of slash removal without underburning, and 8,506 acres of prescribed underburning.

The proposed commercial thinning is designed to reduce stem densities and improve forest health, particularly in stands that are infected with mistletoe, infested with bark beetles, or have overall poor health. Post-sale treatments would include small-tree thinning, slash removal, and underburning where desired. This combination of effects would likely preclude these stands from remaining as nesting habitat in the short term because of the reduced canopy cover, below 25-55 percent used to define dense canopy cover (Reynolds et al. 1982). It is estimated that within lodgepole pine and ponderosa pine treatment units post harvest canopy cover would range from 30-35 percent, and within ponderosa pine treatment units 25-40 percent. Since Reynolds noted a range of canopy cover conditions below the listed mean, modeling may underestimate suitable nesting habitat for both species, because some treatment units may remain functional for this life requirement.

Cooper's hawks would use a more open condition than sharp-shinned hawks, so they may use some of the stands with lower canopy cover for nesting and foraging following treatment activities. Sharp-shinned hawks would be expected to use thinned stands for foraging, but would be less likely to use them for nesting after the completion of treatment activities. Reynolds et al. (1982) stated that observations of foraging hawks indicated they utilized a variety of habitats from openings to dense forest. All stands where treatments occur would function as foraging for both species within the project area.

After implementation of Alternative B, 3,866 acres (71 percent) of Cooper's hawk and 1,507 acres (76 percent) of sharp-shinned hawk potential nesting habitat would remain unmanaged. These numbers are underestimated due to at least 15 percent retention in all treatment units. Alternative B leaves the most potential nesting habitat for Cooper's and sharp-shinned hawk (Table 41).

The 9.2 miles temporary roads that provide access to treatment units are unlikely to have any short- or long-term effect to either species, since less than 20 acres of forested vegetation would be affected. Further, temporary roads may be used as flight paths for hunting prey. The temporary roads would be restored to proper hydrologically functional condition after their intended use. Project implementation would not affect known nest sites for either species.

**Direct and Indirect Effects**
**Alternatives C and D**

Alternatives C and D would treat 2,598 acres (48 percent) of Cooper's hawk and 745 acres (38 percent) of sharp-shinned hawk nesting habitat. Alternatives C and D focus on a strategy to reduce the length of time large trees are absent from areas most heavily infected with dwarf mistletoe, retain decadent lodgepole pine stands, and incorporate a more historical frequent fire regime in appropriate stands. In Alternatives C and D, management actions would also provide the most contiguous habitat acres for potential nest stands when compared to Alternatives B and E. Alternatives C and D propose management activities that would open existing ponderosa pine stands and enhance dense multi-storied stands. The opening of ponderosa pine stands and creation of healthier slightly more open multi-storied stands would benefit the Cooper's hawk, while sharp-shinned hawk would benefit from healthier dense multi-storied stands. Alternatives C and D would retain more decadent lodgepole pine stands, which would provide habitat for Cooper's and sharp-shinned hawks in both the short and long-term. Alternatives C and D propose 9,792 acres of timber harvest, 2,244 acres less than Alternative B and 1,444 acres less than Alternative E, in the project area.

In addition, Alternative D management activities include creating 2-5 acres openings in the most severely infected dwarf mistletoe stands followed by planting of ponderosa pine seedlings in the openings. These openings include the possibility of removing unhealthy infected trees over 21 inches in diameter. These

opening would further reduce canopy cover sought after for nesting habitat by both Cooper's and Sharp-shinned hawks. The openings would encompass a total of 778 acres scattered throughout the Rim-Paunina project area.

In the long term, these stands would create a mosaic of various cover types and structural stages needed for Cooper's and sharp-shinned hawk habitat (Hargis et al. 1994 cited by Wisdom 2000). Per mitigation measures, 15 to 20 percent of each unit (silviculture or fuels) would be retained in an unmanaged condition and continue to provide undisturbed habitat. For the action alternatives, Alternative D would provide the most Cooper's and sharp-shinned hawk nesting habitat in year 2058 (Figure 12 and Figure 13).

For Alternatives C and D, Rim-Paunina analysis determined 52 percent of Cooper's hawk and 62 percent of sharp-shinned hawk potentially suitable nesting habitat would be maintained in its current condition. Additively, Alternatives C and D, like all action alternatives, propose passive-managed patches greater than the standard 15 percent in all treatment units. This would provide more contiguous suitable habitat for MIS species that prefer multi-story stands. As displayed in Table 44 and Table 45 these alternatives show the increasing amount of suitable nesting habitat over all projected decades, including the no-action alternative. Effects from changes in post–harvest canopy cover are as disclosed in the discussion for Alternative B, and cover estimates would likely underestimate the cover actually used by both species. Treatment units would continue to function as foraging habitat for both species.

**Direct and Indirect Effects**

**Alternative E**

Alternative E, proposes commercial harvest to reduce stem densities and improve forest health, particularly in stands that are infected with mistletoe, infested with bark beetles, or have overall poor health. Like Alternatives C and D, Alternative E defers treatment of a few older and decadent lodgepole stands that are specified in Alternative B. This deferment would allow for more potential habitat, as well as provide habitat in the short- and long-term. These stands would provide dense vegetation which serves both Cooper's and sharp-shinned hawks as screening cover and protection from predators while management treatments occur in adjacent units.

With implementation of this alternative, 2,742 acres (50 percent) of Cooper's hawk nesting habitat and 1,208 acres (61 percent) of sharp-shinned hawk nesting habitat within the project area would remain untreated. Alternative E has the least amount of unmanaged potential habitat post-treatment (Table 41). Additionally, as in each alternative, 15 to 20 percent of each unit (silviculture or fuels) would be retained in an unmanaged condition and to provide undisturbed habitat where suitable. These unmanaged portions of treatment units, deferred treatment of older and decadent stands, and surrounding habitat would provide potential nesting and foraging habitat while proposed treatments occur.

**Cumulative Effects**

Table 19 was reviewed for activities that overlap the zone of influence in time and space and have potential to incrementally affect the Cooper's and sharp-shinned hawk. The zone of influence is identified as the 40,000 acre Little Walker Watershed, because it is large enough to include several home ranges for both species. There are no projects which overlap with the Rim-Paunina project area. Therefore, no cumulative effects to the Cooper's and sharp-shinned hawk are projected.

**Conclusion**

In the state of Oregon, the Cooper's and sharp-shinned hawks are listed as S4 'Apparently Secure' through the Oregon Natural Heritage program (NatureServe 2011). Habitat loss in boreal forests, pesticides on farmlands and loss of habitat are the major threats for Sharp-shinned and Cooper's hawks (NatureServe 2011).

For the Rim-Paunina project, nests and foraging habitat would be available in stands outside the treatment units. Alternative B provides 71 percent of untreated habitat for Cooper's hawk and 76 percent for sharp-shinned hawk within the project areas; Alternatives C and D provide 52 and 62 percent respectively, and Alternative E provides 50 and 61 percent respectively. Nesting habitat may also occur in the blocks of habitat big enough to support a nesting pair within activity units where no active management occurs, or 15 percent of each unit. After project implementation, Alternative C would provide the most potential nesting habitat, in year 2018. Alternative D would provide the most potential nesting habitat in year 2058. However, an increase in potential nesting habitat in year 2058 may be due to unmanaged stands exceeding HRV. Exceeding HRV would put stands at risk for a stand replacement event. Project implementation is not expected to lead to a loss in pair territories in the analysis area or across the Crescent Ranger District.

For all action alternatives there is an initial decrease in nesting habitat for the Cooper's and sharp-shinned hawk, but over time the nesting habitat increases for both spices. Nest stands would be available in the blocks of habitat within activity units where no active management occurs, in the 15 percent of activity unit that would be considered a wildlife clump, and in nesting habitat outside of activity units. Habitat outside activity units and the retained passive managed patches inside activity units would result in the same effects as Alternative A, the no action alternative. Alternative A, is projected to provide the most habitat through year 2058. However, without treatment Alternative A has the greatest risk of losing nesting habitat due to a wide-scale disturbance event. The combination of insect, disease, and fire events would compound the long-term loss of northern Cooper's and sharp-shinned hawk nesting habitat.

In the long-term, the Rim-Paunina would result in more resilient nesting habitat. Implementation of the Action Alternatives would contribute to a diversity of cover types and seral stages across the landscape. There are old growth areas that can provide nesting habitat throughout the Rim-Paunina project area as well as unmanaged acres within treatment units. For the Crescent Ranger District, the overall the project would not contribute to a change in the either species' population.

Recent Deschutes National Forest analysis shows there are 275,340 acres of modeled nesting habitat for the Cooper's hawk and 426,138 acres for sharp-shinned hawk forest-wide. This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on district there are no cumulative effects. The project area is 13 percent of the entire Crescent Rangers District, which is only 22 percent of the Deschutes National Forest. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the Cooper's and sharp-shinned hawk.

**Black-backed and Three-toed Woodpeckers**

**Ecology**

Marshall et al. (2003) described the center of abundance for black-backed woodpeckers in Oregon as the lodgepole pine forest east of the Cascade crest between Bend and Klamath Falls. For the three-toed woodpecker, Marshall et al. (2003), describes the species as rare and local reports come sparingly from both slopes of the Cascades and the Blue Mountains. Habitats for both species include lodgepole pine forests, mixed conifer, and mountain hemlock, although forest type may not be as important as the presence of bark beetles (Marshall et al. 2003).

Goggans et al. (1989) conducted a study on the Deschutes National Forest during a mountain pine beetle epidemic, including a portion of the Crescent Ranger District, on both species showing nesting, roosting, and foraging preferences. Both species nest in stands with bark beetles, disease, and heart rot. The Goggans study concluded that lodgepole pine trees with heart rot were used exclusively for nesting by

three-toed woodpeckers with 75 percent of the nests in snags. For black-backed woodpeckers, 89 percent of the nest trees were in lodgepole pine with heart rot, with 65 percent of the nests in live trees. In the study, mean nest tree diameter for each species was 11 inches in diameter, although in the Blue Mountains of Oregon average nest tree diameter was 14.6 inches (Bull et al. cited by Wisdom et al. 2000). Goggans et al. (1989) also concluded that the three-toed woodpeckers selected nest stands at a slightly higher elevation, 4,500-5,600 feet, as compared to black-backs at 4,350-5,400 feet elevation. Neither species prefers to roost in logged forests. Both avoided cut areas for foraging. Other differences included three-toed woodpeckers selected nesting stands undisturbed by logging at a higher rate than black-backs (75 to 49 percent of total nests located) and that three-toed woodpeckers selected mountain hemlock stands for roosting while black-backs selected lodgepole pine, mixed conifer with lodgepole pine, or mountain hemlock with lodgepole pine.

Estimated summer home ranges for three individual black-backed woodpeckers in a bark beetle outbreak varied from 178 to 810 acres, with home ranges decreasing in size as the proportion of unlogged and mature acres of forest increased (Goggans et al. 1989). However, the same study of radio telemetry data of three banded three-toed woodpecker males showed estimated summer home ranges varied from 131 to 751 acres. Home range acreage was not related to the amount of unlogged area or the amount of mature and immature forest present.

For the state of Oregon, the Oregon State Heritage Program ranks both species as S3, 'Vulnerable' (NatureServe 2011). Possible reasons for this listing may be due to fire suppression, cutting of snags, and loss of mature and old-growth forests, but reliable trend and status information is lacking (NatureServe 2011). This is due to each species' association with forest disturbances and large home ranges making it sensitive to logging and forest fragmentation. Both species show an affinity for burned forests and there is good evidence that bark-beetle killed forests are important habitats in Oregon, but the species also occurs sparingly in unburned, mature forests (Marshal et al. 2003). Stand-replacing fires produce habitats that briefly contain abundant food resources for woodpeckers (McCullough et al. 1998 cited in Marshall et al. 2003). After three to five years, the majority of the insects inhabiting the dead wood emerge as adults and do not re-colonize the dead trees, resulting in a decrease in food availability and hence decreased habitat suitability for woodpeckers. Wisdom et al. (2000) reported results from breeding bird surveys (BBS) indicate black-backed trends from 1966-1995 as stable in North America. Trend data generated by breeding bird surveys may be inadequate for monitoring due to this species uncommon status and its difficulty to detect. For the three-toed woodpecker, Wisdom et al. (2000) reported from 14 breeding bird survey routes, trend data showed an annual 0.7 percent decline between 1966 and 1995.

Wisdom et al. (2000) stated there are several factors affecting these species. Silvicultural practices (tree harvest before susceptibility to beetle attack) and fire management policies (salvage logging) have altered natural patterns of beetle outbreaks. Also, increasing road densities have allowed greater human access into forested regions for snag removal as firewood. Usurpation of black-backed nest cavities by hairy woodpeckers and Lewis' woodpeckers (Goggans et al. and Saab and Dudley 1995 cited by Wisdom et al. 2000) may potentially reduce their reproductive success.

**Existing Condition**

The Viable Ecosystem model was used to estimate acres of suitable nesting habitat for the black-backed and three-toed woodpecker (Figure 11). All lodgepole pine, ponderosa pine with lodgepole, mixed conifer, and mountain hemlock PAGs with trees between 5-20 inches diameter above 4,500 feet (minimum Crescent District elevation) was used to model estimated acres of potentially suitable nesting habitat for black-backed and three-toed woodpeckers (Figure 14). This size range was used because the Goggans et al. study (1989) showed nest tree diameters ranged from 7-17 inches. Using this definition, modeling indicated approximately 21,313 acres (53 percent of analysis area) of nesting habitat for black-backed and three-toed woodpeckers and in the analysis area. Black-back woodpecker modeled habitat

was used as a proxy for three-toed modeled habitat because the two species' habitats overlap in the Rim-Paunina project area. This includes 106 acres found on private property in the analysis area. The 21,000 acre Davis Fire in 2003 (outside the planning area), the 80-acre Muttonchop Butte fire in 2000, and the 381-acre Royce Butte fire in 2008 are recent wildfires that are currently providing foraging habitat for these species. Potential nesting habitat is generally distributed across the entire planning area although to a lesser degree in the northeast portion where the forests are predominantly ponderosa pine PAGs with little lodgepole pine present.

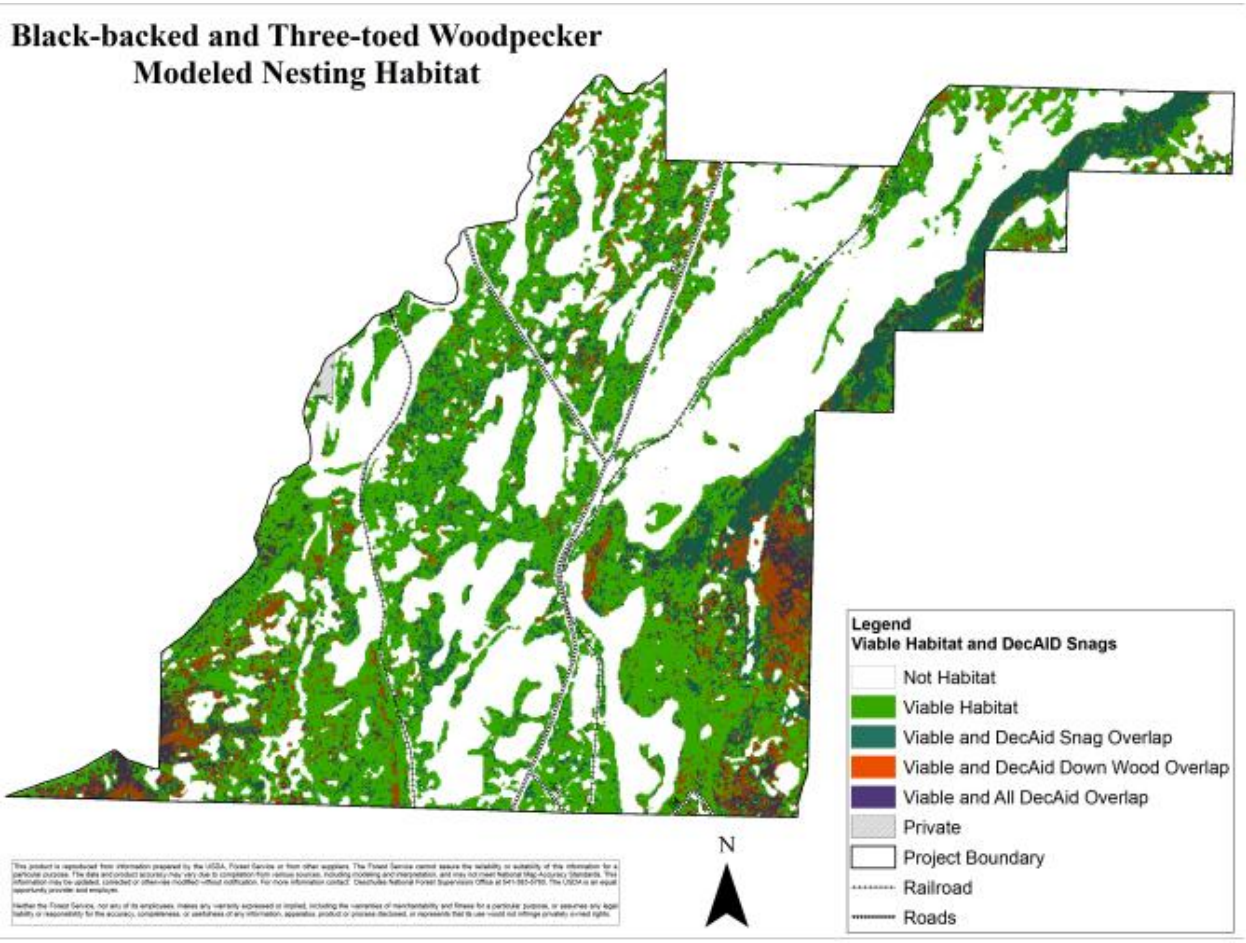



**Figure 14. Potential Black-backed and Three-toed Woodpecker Nesting Habitat Based on the Viable Ecosystem and DecAID Models**

For the Deschutes National Forest, potential nesting habitat was modeled resulting in 446,003 acres for black-backed woodpecker and 367,499 acres three-toed woodpecker. This nesting habitat is scattered in lodgepole, mixed conifer, and mountain hemlock PAG types across the three districts. The modeling datasets used for canopy closure class, stand structure class, PAG, and species are datasets from 2009. All timber sales, fuel reduction activities, natural disturbance events such as wildfire, and vegetation activities on private lands within the Rim-Paunina analysis area were included in this information. All activities that occurred after 2004 and their potential incremental effects within the Rim-Paunina area are discussed further in the cumulative effects section.

District observational records show seven reports of black-backed woodpeckers scattered throughout the project area. One black-backed nest was reported and is located on the southern boundary of the project area. There are no records of three-toed woodpeckers in the analysis area.

Table 46 summarizes the effects of proposed treatments to existing black-backed and three-toed woodpecker nesting habitat in the Rim Paunina project area by alternative. The 'Acres Remaining' column is assumed potential nesting habitat acres once project implementation is completed in 2018. Alternative E for both black-backed and three-toed woodpecker treats the most habitat acres with project implementation. The difference between all action alternatives is nominal, except for Alternative B, which treats the fewest acres of habitat.

**Table 46. Acres of Potential Black-Backed and Three-Toed Woodpecker Nesting Habitat within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Black-backed Woodpecker Nesting Habitat Acres | | |
|---|---|---|---|
| | Pre-Treatment | Acres Treated | Acres Remaining |
| **A** | 21,313 | 0 | 21,313 (100%) |
| **B** | 21,313 | 4751 (22%) | 16,562 (78%) |
| **C** | 21,313 | 6,439 (30%) | 14,874 (70%) |
| **D** | 21,313 | 6,439 (30%) | 14,874 (70%) |
| **E** | 21,313 | 7,034 (33%) | 14,279 (67%) |

The Rim-Paunina project existing condition also includes a 660 foot disturbance zone on all roads and motorized routes. The 660 foot disturbance zone represents existing and potential disturbance from vehicle use on roads and motorized routes (Forman 2000). The assumption is disturbance would continue to effect habitat within the road effect zone (200 meters (~660 feet) each side of roads or motorized trails; Forman et al. 2003). Decreased habitat quality, reduced reproductive potential, and avoidance of the roads and motorized routes effect zones are potential effects as a result of physical habitat alteration or disturbance. However, for woodpeckers and cavity nesters disturbance does not pose as a problem. Hamann et al. (1999) and Gaines et al. (2003) conducted literature reviews of recreational effects, including OHV use, on cavity nesters and woodpeckers. Their results showed that recreational trail-associated disturbances did not present a problem to woodpeckers and cavity nesters as a group. Hamann et al. (1999) also stated that recreational activity is unlikely to be focused around nest sites.

For all alternatives, the amount of nesting habitat both within and outside the 660 foot disturbance buffer increases (Table 47). Between alternatives for the projected years, there is nominal difference in the acres of nesting habitat within and outside the disturbance zone. For each alternative, there is more potential nesting habitat within the disturbance zone, but the difference is slight. By year 2018, after implementation, the most nesting habitat acreage outside the disturbance zone occurs as a result of Alternative C management activities, though there is only a minimal difference between all alternatives. By year 2058, Alternative D results in the most potential nesting habitat acres outside the buffer zone, once again with minimal difference between alternatives.

**Table 47. Acres of Nesting Black-backed and Three-toed Woodpecker Habitat Within and Outside the 660 Foot Disturbance Buffer.**

| | Inside 660-foot Buffer | | Outside 660-foot Buffer | |
|---|---|---|---|---|
| | Year | | | |
| **Alternative** | **2018** | **2058** | **2018** | **2058** |
| **Alt A** | 12,812 (54%) | 13,815 (54%) | 10,994 (46%) | 11,627 (46%) |
| **Alt B** | 11,477 (54%) | 13,217 (54%) | 9,701 (46%) | 11,127 (46%) |
| **Alt C** | 11,812 (54%) | 13,343 (54%) | 10,147 (46%) | 11,195 (46%) |
| **Alt D** | 11,775 (54%) | 13,316 (54%) | 10,145 (46%) | 11,222 (46%) |
| **Alt E** | 11,271 (55%) | 13,169 (54%) | 9,377 (45%) | 11,130 (46%) |

## Direct and Indirect Effects

### Alternative A

The selection of this alternative would have no immediate effect on black-backed and three-toed woodpeckers or their habitat. It is assumed that suitable lands would continue to be occupied by both species regardless of disturbance events resulting in tree mortality. While both species would utilize and selectively seek fire-killed lodgepole and mixed conifer stands to feed on insects, this is a relatively short-term situation. This is also the period when snag fall intensifies, particularly in lodgepole pine forests.

This alternative has the greatest level of risk from a wide-scale disturbance event (i.e. from insect, disease, or fire) and the tradeoff would be short versus long-term habitat. An event of a large magnitude would alter habitat for many decades and would not contribute to suitable habitat conditions over the longer-term.

### Effects Common to All Action Alternatives

The Viable Ecosystem Model estimated there are 21,313 acres of nesting habitat available for the black-backed and three-toed woodpeckers. This is based on tree size classes and appropriate PAGs typically selected for nesting by black-backed woodpeckers.

Table 48 displays the range of tolerance interval based on snag levels taken from DecAID for black-backed and three-toed woodpeckers. Figure 14 depicts Viable Ecosystem modeled habitat and DecAID modeled snag densities for the most likely black-baked and three-toed woodpecker nesting habitat use (denoted in blue-green). The nesting habitat with the highest suitability for use is where the Viable modeled nesting habitat, high snag densities, and high percent of down wood cover overlap, denoted in purple.

Essentially, a tolerance level below 30 percent (0-2.5 snags per acre greater than 10 inches in diameter) is habitat that is less suitable for species use than acreage that supports higher levels of snag densities, which is 30 percent and higher with above 80 percent being the best suitable. For use of snags 10 inches (25 cm) in diameter and greater, 10,195 acres (48 percent) of current nesting habitat is unsuitable for nesting pairs of black-backed and three-toed woodpeckers. There are 5,496 acres (26 percent) that have snag densities less than 2.5 per acre, i.e. below the 30 percent tolerance level and less likely for suitable snag nesting habitat. For comparatively higher suitable nesting snag densities, 5,061 acres have 2.5-13.6 snags per acre (30-50 percent tolerance interval). The 50-80 percent tolerance level provides higher snag densities, which equates to 336 acres (2 percent) of more suitable nesting habitat. The most suitable and highest nesting snag densities fall in the 80 plus percent tolerance interval level. At this tolerance level there are 224 acres (one percent) within current modeled habitat that have 29.2 snags per acre and above.

Overall, there are 11,117 acres (52 percent) of suitable snag densities within the current Viable Ecosystem modeled nesting habitat for black-backed and three-toed woodpeckers.

However, black-backed and three-toed woodpeckers are known to excavate nesting cavities in dead portions of live trees (dead tops, dead limbs, etc.) and down wood in addition to snag habitat. Project Design Features in Chapter 2 of this document disclose the retention of snags and limited circumstances where snag felling may occur. Other Project Design Features require that high value trees to wildlife remain on the site (e.g. multiple topped trees, true firs with conks, etc.). Prescribed burn plans developed after timber harvest activities are completed may include a request to create additional snags from burning where snags are currently limited and the protection of existing snags.

**Table 48. Tolerance Intervals for the Black-backed and Three-toed Woodpeckers and Snag Use**

| **Black-backed Woodpecker 21,313 acres*** | **Density of Snags = 10" dbh by tolerance interval** | | | | |
|---|---|---|---|---|---|
| Tolerance Interval | 0% | 0%-30% | 30%-50% | 50%-80% | 80%+ |
| Density (no./hectare**) | 0 | 0-6.2 | 6.2-34 | 34-72.9 | 72.9+ |
| Density (no./acre**) | 0 | 0-2.5 | 2.5-13.6 | 13.6-29.2 | 29.2+ |
| Percent of Habitat | 48% | 26% | 24% | 2% | 1% |
| Acres | 10,195 | 5,496 | 5,061 | 336 | 224 |

* DecAID snag tables are not available for the Three-toed Woodpecker. Black-backed woodpecker data is used as a proxy.

**From DecAID XX Tables EMC_S/L.sp 22 and PPDF_S/L.sp-22. Information synthesized from various studies. Species utilizing high snag densities are generally utilizing clumps of snags.

Table 48 displays the range of tolerance intervals based on down wood densities taken from DecAID for black-back and three-toed woodpecker. Figure 14 also illustrates the highest likelihood of nesting habitat for down wood densities. The likelihood is where the current Viable nesting habitat overlaps the highest density percentage of down wood greater than five inches in diameter, denoted in red. The nesting habitat with the highest suitability for use is where the Viable modeled nesting habitat, high snag densities, and high percent of down wood cover overlap, denoted in purple.

Of the current modeled nesting habitat, 3,666 acres (17 percent) does not have down wood five inches (12 cm) in diameter and is unlikely to support nesting black-backed or three-toed woodpeckers. The majority of the Viable modeled nesting habitat is capable of supporting nesting pairs, within the 0-30 percent tolerance interval. A total of 13,982 acres (66 percent) are within this 0-30 percent tolerance interval. Within the 30-50 percent tolerance interval, 3,410 acres (16 percent) provide nesting habitat for a higher portion of the black-backed and three-toed pairs. At the 50-80 percent down wood tolerance interval, suitable nesting habitat requires 13-25.1 percent of down wood with a diameter of 5 inches or greater. There are 255 acres (one percent) of Viable nesting habitat which falls within this high percent down wood cover. Lastly, there is no current modeled habitat that has over 25.1 percent down wood cover within the project area; this would have the highest likelihood to support nesting pairs.

However, down wood is not the key factor in nesting habitat for the black-backed and three-toed woodpeckers. As mentioned before, they utilize other resources like snags and dead portions of live trees they can excavate. Project Design Features include retention of down wood and limitations of down wood removal, including within potential fire wood units. Prescribed burn plans will also include the retention of larger dead wood 12 inches in diameter and greater.

**Table 49. Tolerance Intervals for Black-backed and Three-toed Woodpeckers and Down Wood Use**

| **Black-Backed* 21,313 acres** | **Distribution of down wood >=5" (12 cm**)** | | | | |
|---|---|---|---|---|---|
| Tolerance Interval*** | 0% | 0%-30% | 30%-50% | 50%-80% | 80%+ |
| % Down wood Cover**** | 0 | 0-4.7 | 4.7-13 | 13-25.1 | 25.1+ |
| % of Habitat | 17% | 66% | 16% | 1% | 0% |
| Acres | 3,666 | 13,982 | 3,410 | 255 | 0 |

* DecAID snag tables are not available for the Three-toed Woodpecker. Black-backed woodpecker data is used as a proxy.
**Down wood cover categories are 12, 25, 50, 75 and 100% this may over estimate as the study from which tolerance levels were developed only measured down wood greater than 14cm.
***Tolerance intervals based on DecAID table EMC_L.sp-24
****From DecAID 2.1 Tables EMC_S/L.sp 22 and PPDF_S/L.sp-22. Information synthesized from various studies. Species utilizing high snag densities are generally utilizing clumps of snags.

All action alternatives would prescribe thinning and post-sale activities such as non-commercial thinning, piling of slash, firewood removal, and careful reintroduction of prescribed fire, primarily in ponderosa pine dominated PAGs. These actions would reduce canopy cover and lessen vertical vegetation diversity. Existing snag habitat, which is especially important to three-toed woodpeckers for nesting, would generally remain in its current state. Thinning activities would lessen the risk of future large-scale infection, infestation, and fire, but some level of risk would remain present and could affect levels of future tree mortality. These would be distributed in individual trees or clumpy patches. While all snags are intended to remain, some incidental loss may occur during the construction of temporary roads, placement of landings where the logs are stacked and processed, or for occupational safety. Loss of hard snags along designated haul routes has not been monitored; however, professional judgment estimates these numbers to be relatively small and within levels that are routinely felled for public safety along Highway Safety Act roads. Monitoring by harvest inspectors show approximately one percent of snags are lost through harvest. The development of prescribed burning plans incorporates Project Design Features (Chapter 2) for the protection of snags. These features have proven to be effective in numerous projects such as Seven Buttes Return and Baja 58 where over 90 percent of all snags were retained (personal communication with Jeff Bishop, Assistant Fire Management Officer, 2008).

Personal use and/or commercial firewood is proposed within treatment units (Alternatives B, C, and D units: 10, 15, 20, 155, 160, 166, 190, 370, 385, 425, 430, and 870; and Alternative E units: 15, 20, 150, 155, 160, 166, 190, 370, 385, 425, 430, and 870) to provide a product for people in communities that depend on wood for home heating. These are the only treatment units where dead and down wood may be removed. Where firewood removal would occur, Project Design Features have been incorporated to specify minimum levels (see Table 14). All other units utilize Table 13 where the tonnage per acre to be

retained would range from 12-23 in ponderosa pine type PAG. This equates to 11-16 whole trees 16-22 inches in diameter or equivalent, or 2.8-5.2 percent down wood cover. For lodgepole pine PAG type 7-42 tons/acres would be retained. This equates to 17-105 whole trees 8-12 inches in diameter or equivalent, or 2.6-15.9 percent down wood cover. For montane mixed conifer stands (mountain hemlock) PAG type 11-42 tons/acre would be retained. This equates to 11-38 whole trees 16-22 inches in diameter or equivalent, or 2.6-10 percent down wood cover. Monitoring of the woodcutting areas is standard practice on the District and would determine when these levels have been reached. When this occurs, woodcutting areas would be closed down.

For the three-toed woodpecker, all thinning prescriptions in suitable nesting habitat are likely to result in a reduced use of activity areas for nesting purposes (Goggans et al. 1989). In addition, three-toed woodpeckers avoid harvested stands for roosting and foraging, which would require them to acquire these habitat components elsewhere within their home ranges - although the home range is not expected to increase in size. For black-backed woodpeckers, the Goggans (1989) study showed this species is more tolerant in using harvested stands for nesting with half of the nests located within stands disturbed by harvesting. However, she also found, similar to three-toed woodpeckers, that black-backed woodpeckers preferred passively managed stands for foraging; and that all roosting occurred in stands that have not been harvested. Telemetry data confirms black-backed woodpeckers avoid harvested stands for roosting and foraging, causing home range size to increase as the amount of passively managed areas and mature forest decrease.

Table 50 displays projected suitable black-backed and three-toed nesting habitat over time. Although habitat acres would increase in Alternative A, the resulting stand left untreated would be more susceptible to dwarf mistletoe infection, bark beetle infestation, and fire events when compared to action alternatives. Action Alternative acreage increases over time as a result of expected increase in tree vigor from thinning, reducing overcrowded stands, reducing fuel loading, and the probability of advancing stands to the next successional stages. For year 2018, Alternatives B and E decrease habitat acres, while Alternatives C and D increase habitat. Alternatives C and D are projected to provide the most nesting habitat as a result of the proposed management treatments, though the differences between alternatives are only a few hundred acres. By 2058, all action alternatives significantly increase healthy suitable habitat.

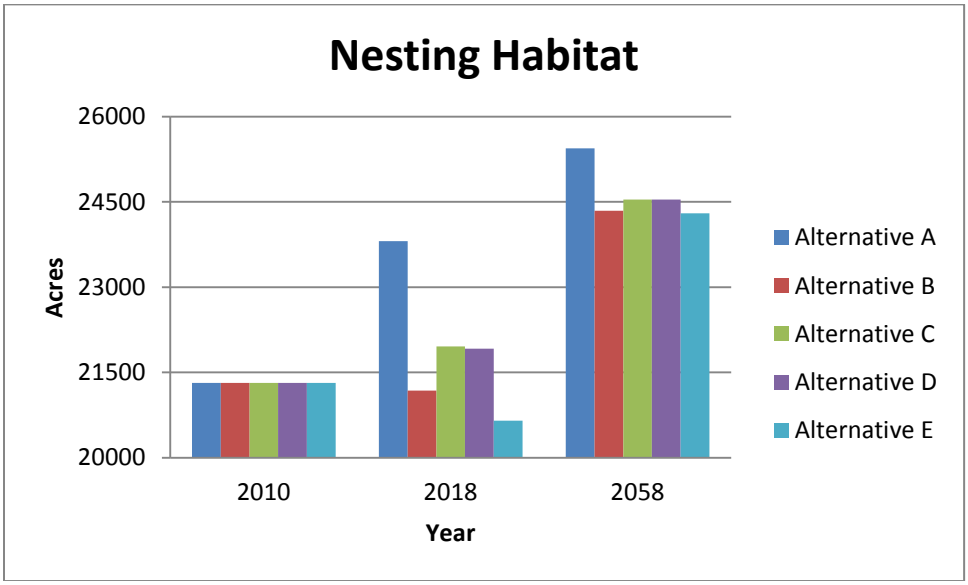



**Figure 15. Viable Ecosystem Modeling Projection of Black-backed and Three-Toed Woodpecker Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 50. Viable Ecosystem Modeling Projection of Black-backed and Three-Toed Woodpecker Nesting Habitat Acres over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Black-backed Woodpecker Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| **A** | 21,313 | 23,806 | 25,442 |
| **B** | 21,313 | 21,178 | 24,344 |
| **C** | 21,313 | 21,959 | 24,538 |
| **D** | 21,313 | 21,919 | 24,538 |
| **E** | 21,313 | 20,648 | 24,299 |

At least 15 percent of each proposed activity unit would be managed in a passive scenario (Chapter 2). The retention of untreated acres may be capable of providing nesting habitat where appropriate structure exists. Because well distributed nesting habitat is available to function as future replacement, there would be no reduction in the numbers of Black-backed or Three-toed woodpecker home ranges that can be supported across the analysis area. In addition, there would be no loss of Late and Old Structured habitat, because the largest trees would be retained, except in Alternative D where some trees over 21 inches would be removed to address mistletoe infection. Within younger-aged stands, reduced competition for scarce resources as a result of thinning would allow the residual trees to increase their size potential. Also, management practices would encourage development of a more resilient forest, e.g. reducing the risk of disease, infestation, and fire events in nesting habitat.

Viable Ecosystem modeling accounted for all active management that has occurred in the Rim-Paunina project area up to September 2004. It is assumed most of the habitat available is on Federal lands.

**Direct and Indirect Effects**

**Alternative B**

The selection of this alternative would enhance open single story ponderosa pine forests, by reducing the mixed conifer multilayered component and overall tree density. The majority of proposed thinning treatment units are in ponderosa pine forests (unsuitable nesting habitat), with some in lodgepole pine and in a few mixed conifer forests (suitable nesting habitat). Hence, this alternative would treat the least amount of nesting habitat, 4,751 acres (22 percent of habitat) leaving seventy-eight percent untreated. Neither species uses harvested area for foraging nor roosting (Goggans et al. 1989); however ponderosa pine PAG type, the majority of the proposed treatment areas, is not the preferred nesting or roosting habitat.

Table 50 shows an increasing trend in suitable nesting acres. Projected acreage of nesting habitat for the black-backed and three-toed woodpeckers is 24,344 acres in 2058, which are 45 more acres than Alternative E and 194 acres less than Alternatives C and D. This would result in an increase in the number of pairs the analysis area could support. With an increase in the amount of nesting habitat projected, the associated risk of a disturbance event would be elevated. However, in contrast to the risk expressed for Alternative A, it would be less wide-scale and endemic as stands approach biological capabilities.

**Direct and Indirect Effects**
**Alternatives C and D**
Alternatives C and D would provide more suitable contiguous habitat for nesting, roosting, or foraging black-backed woodpeckers. Implementation of these two alternatives provide a balance of treatment acres, both short and long-term, between open ponderosa stands and a denser, multi-layered stands, which are more conducive to black-backed woodpeckers. Although, no activity would occur in selected decadent lodgepole pine stands, there would still be improvement cuts in other lodgepole pine forests, which is more conducive habitat for three-toed woodpeckers. For Alternatives C and D, 6,439 acres (30 percent) of black-backed and three-toed woodpecker nesting habitat would be treated in the analysis area leaving seventy percent untreated.

In addition, Alternative D includes group selection in severely mistletoe infected stands, creating 2-5 acre openings, removing all infected trees, including those over 21 inches in diameter, and planting ponderosa pine seedlings in the openings. These activities are proposed to break the dwarf mistletoe cycle of continual infection by creating openings and planting uninfected ponderosa pine. Alternative D management activities would remove more overstory needed for suitable nesting habitat on the short-term level than Alternatives B and C, but over time there would be an increase in healthy habitat. Additionally, no activity would occur in selected decadent lodgepole pine stands in treatment units as in Alternative C.

Similar to Alternative B, Alternatives C and D have a projected increase in nesting habitat for black-back and three-toed woodpeckers in 2018 and 2058 (Table 50). By 2058, both alternatives project 194 more acres than Alternative B and 239 more acres than Alternative E. This would result in an increase in the number of pairs the analysis area could support. With an increase in the amount of nesting habitat projected, the associated risk of a disturbance event would be elevated. However, in contrast to the risk expressed in Alternative A, it would be less wide-scale and endemic as stands approach biological capabilities.

**Direct and Indirect Effects**
**Alternative E**
The selection of this alternative would implement the most management activities within nesting habitat for the black-backed and three-toed woodpecker. Alternative E proposes to treat 7,034 acres (33 percent) of black-backed and three-toed woodpecker nesting habitat in the analysis area, leaving sixty-seven percent of habitat untreated. Similar to Alternative D, this alternative reduces the overstory component in severely mistletoe-infected stands. Openings would be created where severely infected trees have infected the understory. In the openings, all trees under 21 inches in diameter would be removed and for trees 21 inches in diameter and greater, proposed management activities would induce mortality. This induced mortality would retain the large trees within the openings and add to the recruitment of more snags than all other action alternatives, providing nesting trees for woodpecker species in suitable habitats.

Similar to all action alternatives, this alternative is projected to increase nesting habitat, but by the least amount, for black-backed and three-toed woodpeckers in 2018 and 2058 (Table 50). By 2058, Alternative E projects 194 less acres than Alternatives C and D and 45 less acres than Alternative B, but 2,986 acres more than the existing condition. This increase in habitat would still result in an increase in the number of pairs the analysis area could support. With an increase in the amount of nesting habitat projected, the associated risk of a disturbance event would be elevated. However, in contrast to the risk expressed in Alternative A, it would be less wide-scale and endemic as stands approach biological capabilities

**Cumulative Effects**
Table 19 was reviewed for activities that overlap the zone of influence in time and space and have the potential to incrementally affect three-toed and black-backed woodpeckers. The zone of influence is identified as the 40,000-acre Little Walker Watershed because it is large enough to include several home ranges for both species. The remaining projects from Table 19 listed as "completed" no longer have any effects that are quantifiable. No on going or current projects overlap with the project area.

Snag densities on private land in the project area are assumed to be low because most landowners want to reduce wildfire potential on their land. Consequently, snag habitat is likely limited and may not be available to woodpeckers for very long and would not contribute to nesting populations. The new Gilchrist State Forest that abuts the project area has a stated objective "to maintain the forestlands as managed/working forests and conserve forestlands that could be lost to parcelization and/or development." [19] Activities would focus on developing an integrated management plan for recreation, sustainable forestry, and wildlife habitat. Forest management activities would match the Eastern Oregon Regional Forest Management Plan which would likely thin overly dense young forests in the first decade.

There are no foreseeable actions that have potential to reduce suitable habitat for either woodpecker. When past, present, and foreseeable actions are combined, the amount of suitable nesting habitat present in the analysis area would not result in a long-term decreasing trend for either woodpecker species. There are no actions since November 2004 with potential to alter habitat in the Rim Paunina project area. No cumulative effects to the three-toed and black-backed woodpeckers are projected.

**Conclusion**
Within the state of Oregon, the Oregon State Heritage Program listed three-toed and black-backed woodpeckers as S3 'Vulnerable' (NatureServe 2011). For Alternatives C, D, and E the one known, black-backed woodpecker nest within the project area is located in a 'fuels only' treatment unit, which is an underburn consuming ground vegetation and small trees only. Habitat components, like overstory, would not be affected.

For all action alternatives, the majority of proposed thinning and fuel treatments are in ponderosa pine forests, which is not habitat for either species. Alternatives C and D provide the best treatment options for the two species by maintaining a denser multi-storied canopy cover with retention of decadent lodgepole stands. For all Rim-Paunina mitigation measures and Project Design Features (Chapter 2), snag removal would be restricted to timber sale landings, temporary road construction, and those deemed a safety hazard to forest workers. Therefore the Rim-Paunina project would not contribute to a change in viability on the Deschutes National Forest for the Black-backed or Three-toed woodpecker.

In the long-term, the Rim-Paunina project would result in more resilient nesting habitat. Implementation of action alternatives would contribute to a diversity of cover types and seral stages across the landscape. There are old growth areas that can provide nesting habitat throughout the Rim-Paunina project area as well as unmanaged acres within treatment units. For the Crescent Ranger District, the overall the project would not contribute to a change in the either species' population.

This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on district there are no cumulative effects. For both species, nesting habitat is projected to increase after implementation (Table 50). Recent Deschutes National Forest analysis shows there are 367,499 acres of modeled nesting habitat for the three-toed and 446,003 acres for black-backed woodpeckers. The project area is only a 13 percent of the entire Crescent Ranger District, which is only 22 percent of the Deschutes

[19] State of Oregon Staff Analysis of the Proposed Acquisition, November, 2009

National Forest. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of three-toed and black-backed woodpeckers.

**Woodpecker Guild**

Effects to the white-headed and Lewis' woodpeckers have been disclosed in the Threatened, Endangered, and Sensitive section of this Chapter. Effects to the pileated, hairy and downy woodpeckers and the Williamson's and red-naped sapsucker and northern flicker are discussed here. Direct, indirect, and cumulative effects are discussed at the end of the woodpecker guild section.

**Pileated, Hairy, and Downy Woodpeckers and the Williamson's and Red-Naped Sapsuckers and Northern Flickers**

**Ecology**

The hairy and downy woodpeckers, the northern flicker, and the Williamson's and red-naped sapsucker are described as common inhabitants of Oregon and the pileated woodpecker is an uncommon species in Oregon limited altitudinally by habitat availability (Marshall et al. 2003). This guild of species is dependent upon snags and/or live trees with internal rot for nesting or roosting cavities and as a forage substrate.

However, there are differences in the selection of preferred habitats among the species. The northern flicker is generally most abundant in open forests and forest edges. The Williamson's sapsucker prefers mid-to-high elevation mature or old-structured forests with fairly open canopy cover. The downy woodpecker and red-naped sapsucker prefer riparian areas with hardwoods. The hairy woodpecker utilizes mixed-conifer forests and ponderosa pine as well as adjacent deciduous stands, while the pileated occurs primarily in dense mixed conifer forests in late seral stages or in deciduous trees stands in valley bottoms (Marshall et al. 2003). Population trends in Oregon have been reported as stable (Williamson's sapsuckers) or a non-significant decline ranging from 0.4-0.6 percent per year based on Breeding Bird Surveys 1966-2000 as reported by Marshall et al. (2003) for the remaining species. For the state of Oregon, the Oregon State Heritage Program 2011 lists state the hairy, downy, and pileated woodpeckers and the red-naped sapsucker species ranking as S4, 'Apparently Secure'. NatureServe (2011) listed the following as the top five major threats afflicting pileated woodpeckers (1) conversion of forest habitats to non-forest habitats, (2) short rotation, even-age forestry, (3) monoculture forestry, (4) forest fragmentation, and (5) removal of logging residue, downed wood, and pine straw that would ultimately put nutrients back into the ecosystem and provide foraging substrate. For hairy woodpeckers possible local declines may result from usurpation of nest cavities by house sparrows or starlings. The Williamson's sapsucker is listed as S4B, 'Apparently Secure' for breeding populations and S3N, 'Vulnerable' for nonbreeding populations (NatureServe 2011). This ranking differs from the 2008 S5 'Secure' listing. There were no reasons given for the declines. Northern flickers are ranked as S5, 'Secure' (NatureServe 2011).

**Existing Condition**

Pileated woodpecker habitat for the Deschutes National Forest is defined as ponderosa pine stands with Douglas fir, white fir, mountain hemlock, and Shasta red fir stands with greater than 15-20 inch in diameter trees and a dense canopy condition. Using the above definition, the Viable Ecosystem modeling estimated 1,417 acres of potential pileated nesting habitat in the project analysis area. For the Williamson's sapsucker, the nesting habitat definition was ponderosa pine and white fir stands where the ponderosa pine present was greater than 15-20 inches in diameter in an open canopy condition (1,094 acres). The northern flicker nesting habitat was most abundant in older open forests and forest edges, avoiding dense forests (1,553 acres), though they are habitat generalists and are found throughout the Crescent Ranger District. Individual modeling for the hairy and downy woodpeckers were not conducted. Hairy woodpeckers, like the northern flicker, are habitat generalists and occur throughout the Crescent

Ranger District. On the district, downy woodpeckers and red-naped sapsuckers are found in deciduous and mixed deciduous-conifer forests and in riparian habitat, where they are most abundant (Marshall et al. 2003). There has been no specific survey conducted for hairy and downy woodpeckers, the northern flicker, and the Williamson's sapsucker, although district observational records show six Williamson's sapsucker sightings and one nest clustered around the Walker Mountain area. One northern flicker sighting was also noted in the west section of the project area. While conducting other wildlife inventories, wildlife crews have seen the remaining species within the analysis area (Boucher, pers. comm. 2008; Rosterolla, pers. comm. 2009).

The Rim-Paunina project existing condition also includes a 660 foot disturbance zone on all roads and motorized routes. The 660 foot disturbance zone represents existing and potential disturbance from vehicle use on roads and motorized routes (Forman 2000). The assumption is disturbance would continue to effect habitat within the road effect zone (200 meters (~660 ft) each side of roads or motorized trails; Forman 2000). Decreased habitat quality, reduced reproductive potential, and avoidance of the roads and motorized routes effect zones are potential effects as a result of habitat alteration physically or due to disturbance.

For the woodpecker guild and cavity nesters, Hamann et al. (1999) and Gaines et al. (2003) have conducted literature reviews of recreational effects, including OHV use. Their reviews showed recreational trail-associated disturbances did not present a problem to woodpeckers and cavity nesters as a group. This includes the 660 foot (200 meters) disturbance buffer Forman (2000) used for his study on potential disturbances from vehicle use on motorized trails. Hamann et al. (1999) also stated that recreational activity is unlikely to be focused around nest sites of these species.

The most current reviews of recreational trail-associated literature including OHV use did not present a problem to woodpeckers and cavity nesters as a group. Reference the Three Trails OHV EIS for further discussion on the effects of motorized routes and project activities on the woodpecker guild (Three Trails OHV EIS 2010).

## *Environmental Consequences*

**Direct and Indirect Effects**
**Alternative A**
This alternative would have no immediate effect on any of the species in the woodpecker guild. For the Rim-Paunina project area, it is assumed that in the short-term, endemic levels of insects, disease, and density related mortality to existing stands would continue to provide snag habitat for all species in these guild. Over time, increased canopy layering and tree density would subject these stands to increased levels of risk of loss due to fire, insect, and disease. This could result in a temporary increase in high density snag conditions favorable to these listed species.

This alternative has the greatest level of risk from a wide-scale disturbance event (i.e. from insect, disease, or fire) and the tradeoff would be short versus long-term habitat. An event of a large magnitude would alter habitat for many decades and would not contribute to suitable nesting habitat conditions over the longer-term.

**Direct and Indirect Effects Common to All Alternatives**
Figure 16 to Figure 18 and Table 51 to Table 53 display projections of suitable pileated woodpecker, Williamson sapsucker, and northern flicker nesting habitat by alternative over time. All action alternative acreage amounts increase over time as a result of expected increase in tree vigor from thinning, reducing overcrowded stands, reducing fuel loading, and the probability of advancing stands to the next

successional stages. By year 2058 increased habitat would also include stands that are untreated and possibly exceeding HRV resulting in the same effects as Alternative A.

The Rim-Paunina project area is not a high source of habitat for the pileated woodpecker. Historically, the project area was a predominantly open, single-story, ponderosa pine stand with a small mixed conifer component on the upper Walker Rim. Due to over-crowding a dense multi-layer canopy of ponderosa and lodgepole pine with some mixed conifer is now modeled as potential habitat. However, these stands exceed HRV and are at high risk of a stand replacement event. All action alternatives increase nesting habitat post-implementation. While Alternative C has the most modeled potential habitat post-implementation in 2018 and projected for 2058, the acreage habitat between each action alternative is nominal. Concerning projected year 2058, there is more modeled potential nesting habitat because there is no vegetative activity to maintain HRV (Table 51). By not maintaining HRV, stand densities and stand canopy cover increase which results in more conducive pileated woodpecker nesting habitat.

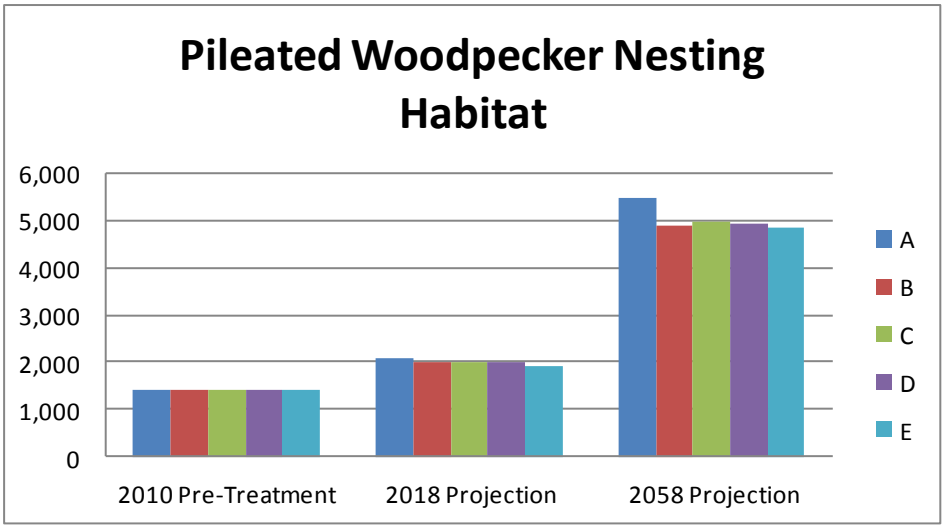



**Figure 16. Viable Ecosystem Modeling Projection of Pileated Woodpecker Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 51. Viable Ecosystem Modeling Projection of Pileated Woodpecker Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Pileated Woodpecker Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| **A** | 1,417 | 2,096 | 5,454 |
| **B** | 1,417 | 1,984 | 4,897 |
| **C** | 1,417 | 2,008 | 4,959 |
| **D** | 1,417 | 1,993 | 4,928 |
| **E** | 1,417 | 1,926 | 4,830 |

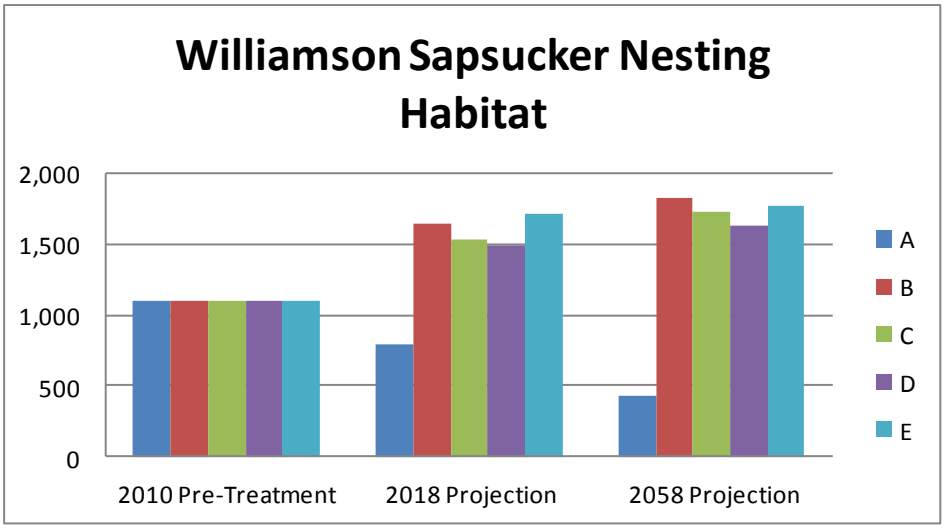



**Figure 17. Viable Ecosystem Modeling Projection of Williamson Sapsucker Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 52. Viable Ecosystem Modeling Projection of Williamson Sapsucker Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Williamson Sapsucker Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| **A** | 1,094 | 789 | 425 |
| **B** | 1,094 | 1,646 | 1,829 |
| **C** | 1,094 | 1,537 | 1,723 |
| **D** | 1,094 | 1,491 | 1,628 |
| **E** | 1,094 | 1,707 | 1,771 |

All action alternatives increase modeled potential nesting habitat after project implementation in 2018 and 2058 for the Williamson sapsucker. Williamson sapsucker potential nesting habitat includes ponderosa pine stands with an open canopy, which the Rim-Paunina project proposes management for. Post implementation (year 2018), Alternative E results in the highest amount of modeled nesting habitat, whereas Alternative B results in the highest amount of modeled potential nesting habitat in year 2058. Alternatives B and E propose more treatment in units which will open canopy cover, resulting in stands closer to HRV for ponderosa pine PAG types. However, the difference between each action alternative is nominal after project implementation and in projected year 2058.

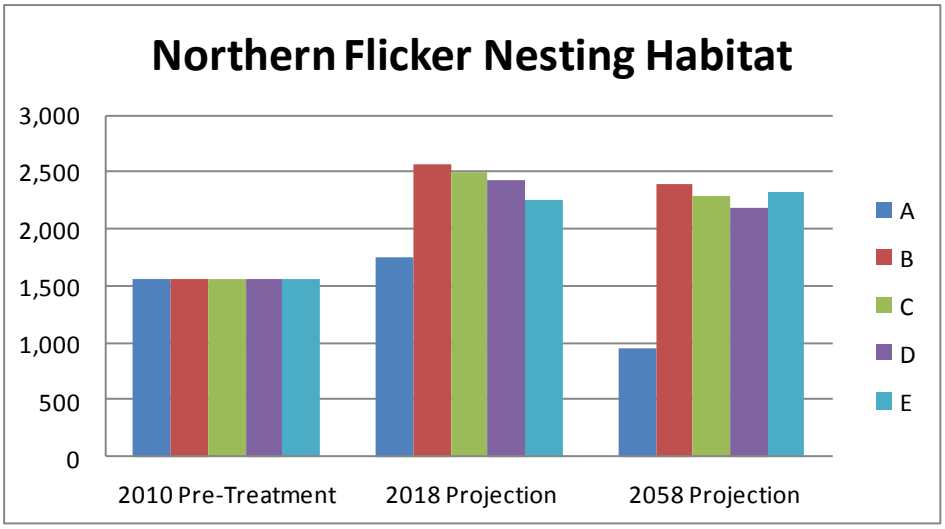



**Figure 18. Viable Ecosystem Modeling Projection of Northern Flicker Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

**Table 53. Viable Ecosystem Modeling Projection of Northern Flicker Nesting Habitat over Time within the Rim-Paunina Project Area (National Forest System Lands only)**

| Alternative | Northern Flicker Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| **A** | 1,553 | 1,756 | 953 |
| **B** | 1,553 | 2,568 | 2,397 |
| **C** | 1,553 | 2,504 | 2,281 |
| **D** | 1,553 | 2,427 | 2,184 |
| **E** | 1,553 | 2,259 | 2,318 |

Like the Williamson sapsucker, the northern flicker also prefers open older PAG types. All action alternatives increase nesting habitat after project implementation in 2018. Alternative B prescribed treatments result in the most nesting habitat after project implementation in 2018 and in year 2058. This alternative, as well as Alternative E, opens more of the ponderosa pine PAG types, returning them to HRV, open single-story stands. In the long-term both of these alternatives would have lower stand density compared to Alternatives C and D. However, the difference between each action alternative is nominal after project implementation and in projected year 2058. Modeling shows that in year 2058 projected acres of habitat would decrease compared to after project implementation. This may be due to stands and canopy cover becoming denser due to lack of vegetation management and lack of re-entry into units.

The Viable Ecosystem Model estimated 1,417 acres of current nesting habitat for the pileated woodpecker based on suitable PAGs and tree diameters typically selected for nesting. Table 54 displays the range of tolerance intervals based on snag levels taken from DecAID for snags 10 inches in diameter (dbh) and 20 inches dbh. Essentially, a tolerance level below 30 percent (0-14.9 snags per acre greater than 10 inches

in diameter or 0-3.5 snags per acre greater than 20 inches dbh) is habitat that is less suitable than acres with higher snag densities. There are 290 acres (20 percent) of the current suitable acres according to Viable that have zero snags per acre greater than 10 inches in diameters. For the 0 to 30 percent tolerance interval, 1,086 acres (77 percent of modeled habitat) have a snag density less than 14.9 snags per acre for snags greater than 10 inches in diameter, which is unlikely habitat to support nesting pairs. There are 27 acres (2 percent of modeled habitat) with snag densities meeting or exceeding 14.9-30.1 snags per acre. This has a higher likelihood of supporting nesting pairs. For snags greater than 10 inches in diameter, 14 acres (one percent) of the defined Viable nesting acres exceed 30.1snags per acre, providing a higher likelihood of suitable habitat for nesting pairs. There is no current Viable habitat with snag densities above 49.3 snags per acre for snags greater than 10 inches dbh, in the 80 plus percent tolerance interval. The majority of the current Viable modeled habitat has a low likelihood of nesting pair use for snags 10 inches in diameter.

For snag densities of trees 20 inches dbh and greater there are 348 acres (25 percent) of the current Viable modeled nesting habitat which have no snags. For the 0 to 30 percent tolerance interval, 1,046 acres (74 percent of modeled habitat) have a snag density less than 3.5 snags per acre greater than 20 inches in diameter, which is unlikely habitat to support nesting pairs. There are nine acres (one percent of modeled habitat) with snag densities meeting or exceeding 3.5-7.8 snags per acre. This has a higher likelihood of supporting nesting pairs. For snags greater than 20 in diameter, 14 acres (1 percent) of the defined Viable nesting acres exceed 7.8 snags per acre, providing a higher likelihood of suitable habitat for nesting pairs. There is no current Viable habitat with snag densities above 18.4 snags per acre for snags greater than 20 inches dbh, in the 80 plus percent tolerance interval. The majority of the current Viable modeled habitat has a low likelihood of nesting pair use for snags 20 inches in diameter.

**Table 54. Tolerance Intervals for the Pileated Woodpecker and Snag Use**

| **Pileated Woodpecker 1,417 acres** | **Density of Snags = 10" dbh by tolerance interval** | | | | | **Density of Snags = 20" dbh by tolerance interval** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Tolerance Interval | 0% | 0%-30% | 30%-50% | 50%-80% | 80% + | 0% | 0%-30% | 30%-50% | 50%-80% | 80% + |
| Density (no./hectare*) | 0 | 0-37.2 | 37.2-75.2 | 75.2-123.2 | 123.2 + | 0 | 0-8.8 | 8.8-19.4 | 19.4-45.9 | 45.9 + |
| Density (no./acre*) | 0 | 0-14.9 | 14.9-30.1 | 30.1-49.3 | 49.3 + | 0 | 0-3.5 | 3.5-7.8 | 7.8-18.4 | 18.4 + |
| Percent of Habitat | 20 % | 77% | 2% | 1% | 0% | 25% | 74% | 1% | 1% | 0% |
| Acres | 29 0 | 1,086 | 27 | 14 | 0 | 348 | 1,046 | 9 | 14 | 0 |
| *From DecAID 2.1 Tables EMC_S/L.sp 22 and PPDF_S/L.sp-22. Information synthesized from various studies. Species utilizing high snag densities are generally utilizing clumps of snags. | | | | | | | | | | |

Table 55 displays the range of tolerance intervals based on down wood densities taken from DecAID for pileated woodpecker. Of the current Viable Ecosystem modeled nesting habitat, 632 acres (45 percent) does not have down wood 5 inches (12 cm) in diameter and is unlikely to support nesting pileated woodpeckers. The majority of the Viable modeled nesting habitat is capable of supporting nesting pairs, both within the 0-30 percent tolerance interval and on acres with greater than 4 percent down wood cover. A total of 457 acres (32 percent) are within the 0-30 percent tolerance interval. Within the 30-50 percent tolerance interval, five acres (0 percent) provide nesting habitat for a higher portion of nesting pairs. At the 50-80 percent down wood tolerance interval, suitable nesting habitat requires 4.5 to 5.1 percent of down wood with a diameter of 5 inches or greater. There are 197 acres (14 percent) of Viable nesting

habitat which falls within this level of down wood cover. For the 80 percent tolerance interval, there are 125 acres (9 percent) of current Viable modeled habitat for down wood 5 inches dbh and greater.

**Table 55. Tolerance Intervals for the Pileated Woodpecker and Down Wood Use**

| **Pileated Woodpecker 1,417 acres** | **Distribution of down wood >=5" (12 cm*)** | | | | |
|---|---|---|---|---|---|
| Tolerance Interval** | 0% | 0%-30% | 30%-50% | 50%-80% | 80%+ |
| % Down wood Cover*** | 0 | 0-4 | 4-4.5 | 4.5-5.1 | 5.1+ |
| % of Habitat | 45% | 32% | 0% | 14% | 9% |
| Acres | 632 | 457 | 5 | 197 | 125 |

*GNN Attributes down wood cover categories are 12, 25, 50, 75 or 100% this may over estimate as the study from which tolerance levels were developed only measured down wood greater than 15cm.

**Tolerance intervals based on DecAID table EMC_L.sp-24

***From DecAID 2.1 Tables EMC_S/L.sp 22 and PPDF_S/L.sp-22. Information synthesized from various studies. Species utilizing high snag densities are generally utilizing clumps of snags.

Historically the Rim-Paunina project area was not a high source of habitat for pileated woodpecker. Due to over-crowding, a dense multi-layer canopy of ponderosa and lodgepole pine with some mixed-conifer now exists as potential habitat. These stands are currently above HRV and result in low acres of Viable modeled nesting habitat, snags levels, and down wood.

Project Design Features in Chapter 2 of this document disclose the retention of snags and limited circumstances where snag felling may occur. For down wood, the Project Design Features state to retain down wood and limit down wood removal, including removal within potential fire wood units. Other Project Design Features include retaining high value trees to wildlife on the site (e.g. live multiple topped trees, true firs with conks, etc). Additionally, prescribed burn plans developed after timber harvest activities are completed may include a request to create additional snags from burning where snags are currently limited and the protection of existing snags. For down wood, prescribed burn plans will also include the retention of larger dead wood 12 inches in diameter and greater.

The Viable Ecosystem Model estimated 1,094 acres of nesting habitat for the Williamson sapsucker based on suitable PAGs and tree diameters typically selected for nesting. Table 52 displays the range of tolerance intervals based on snag levels taken from DecAID. Essentially, a tolerance level below 30 percent (0-14 snags per acre greater than 10 inches dbh, or 0-3.3 snags per acre greater than 20 inches dbh) is less suitable for Williamson sapsuckers than acres with higher snag densities. Currently 488 acres (45 percent) of the Viable Ecosystem-defined nesting acres have zero snags per acre greater than 10 inches in diameter. There are also 601 acres (55 percent) of nesting habitat with less than 14 snags per acre which equates to a 0-30 percent tolerance interval. For snags 10 inches dbh and greater, four acres of the current Viable modeled nesting habitat are suitable (i.e. are with in the 30 to 50 percent or 50 to 80 percent tolerance interval levels). There is no modeled nesting habitat with snag densities greater than 49.7 snags per acre for snags 10 inches dbh and greater. The majority of current Viable nesting habitat for the Williamson Sapsucker is unlikely to support nesting pairs for snags 10 inches dbh and greater.

Currently 574 acres (53 percent) of the Viable Ecosystem-defined nesting acres have zero snags per acre greater than 20 inches in diameter. There are also 514 acres (47 percent) of nesting habitat with less than 14 snags per acre which equates to a 0-30 percent or greater tolerance interval. For snags 20 inches dbh and greater, four acres of the current Viable modeled nesting habitat are suitable (30 to 50 percent tolerance interval level). There are two acres of current modeled habitat which is has a high likelihood of nesting use, within the 50-80 percent tolerance level. There is no modeled nesting habitat with snag densities greater than 16.6 snags per acre for snags 20 inches dbh and greater. The majority of current Viable nesting habitat for the Williamson Sapsucker is unlikely to support nesting pairs for snags 20 inches dbh and greater.

Like the pileated wood pecker, the Williamson sapsucker has low acres of suitable habitat within the Rim-Paunina project area. The same Project Design Features protect existing habitat as with the pileated woodpecker.

**Table 56. Tolerance Intervals for the Williamson Sapsucker and Snag Use**

| **Williamson Sapsucker 1,094 acres** | **Density of Snags = 10" dbh by tolerance interval** | | | | | **Density of Snags = 20" dbh by tolerance interval** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Tolerance Interval | 0% | 0%-30% | 30%-50% | 50%-80% | 80%+ | 0% | 0%-30% | 30%-50% | 50%-80% | 80%+ |
| Density (no./hectare*) | 0 | 0-35.1 | 35.1-71 | 71-124.2 | 124.2+ | 0 | 0-8.2 | 8.2-21.6 | 21.6-41.4 | 41.4+ |
| Density (no./acre*) | 0 | 0-14 | 14-28.4 | 28.4-49.7 | 49.7+ | 0 | 0-3.3 | 3.3-8.6 | 8.6-16.6 | 16.6+ |
| Percent of Habitat | 45% | 55% | 0% | 0% | 0% | 53% | 47% | 0% | 0% | 0% |
| Acres | 488 | 601 | 2 | 2 | 0 | 574 | 514 | 4 | 2 | 0 |
| *From DecAID 2.1 Tables EMC_S/L.sp 22 and PPDF_S/L.sp-22. Information synthesized from various studies. Species utilizing high snag densities are generally utilizing clumps of snags. | | | | | | | | | | |

All four action alternatives propose a combination of commercial thinning, improvement cuts, slash treatments, underburning, and activities related to “fuels only” prescriptions that would remove live trees less than eight inches diameter to approximate 18-foot spacing. Additionally, Alternative D proposes group selection in severely mistletoe-infected stands, including removal of trees over 21 inches in diameter. Alternative E proposes removal of infected trees under 21 inches in diameter while inducing mortality for those over 21 inches in the most severely infected stands on approximately 1,921 acres, which would contribute to snag recruitment. The total acres of treatments vary between alternatives; however, the effects would be similar. In addition, for each action alternative there is personal and/or commercial firewood removal proposed in a limited number of harvest units.

Personal use and/or commercial firewood is proposed within treatment units (Alternatives B, C, and D units: 10, 15, 20, 155, 160, 166, 190, 370, 385, 425, 430, and 870; and Alternative E units: 15, 20, 150, 155, 160, 166, 190, 370, 385, 425, 430, and 870) to provide a product for people in communities that depend on wood for home heating. These are the only treatment units where dead and down wood may be removed. Where firewood removal would occur, Project Design Features have been incorporated to specify minimum levels. The tonnage per acre to be retained would range from 12-23 in the ponderosa

pine PAG. This equates to 11-16 whole trees 16-22 inches in diameter or equivalent, or 2.8-5.2 percent down wood cover. For lodgepole pine PAG type 7-42 tons/acre would be retained. This equates to 17-105 whole trees 8-12 inches in diameter or equivalent, or 2.6-15.9 percent down wood cover. For montane mixed conifer stands (mountain hemlock) PAG type, 11-42 tons/acre would be retained. This equates to 11-38 whole trees 16-22 inches in diameter or equivalent, or to 2.6-10 percent down wood cover. Monitoring of the woodcutting areas is standard practice on the District and would determine when these levels have been reached. When this occurs, woodcutting areas would be closed down.

The felling of snags would not occur except those that must be removed under limited circumstances such as clearing for temporary road construction (9.2 miles Alternative B, 6.5 miles in Alternatives C and D, and 8.3 miles Alternative E), where the placement of log landings would occur and for occupational safety (Project Design Features, Chapter 2). Prescribed underburning would include "burn plans" which include methods to protect snags and down logs, such as building handline to exclude fire. District wide post-burn monitoring has determined these measures are generally effective in preventing the snags and down logs from charring. On occasion, new snags are created from underburning operations in areas where snag densities are low. This is determined for every activity unit before site-specific prescribed burning prescriptions are written during the Crescent District post-sale monitoring review.

Commercial thinning of live trees would likely affect future snag recruitment on those trees that would have succumbed to competition from stress-related mortality (e.g. competition for scarce site resources). However, the increased tree growth of residual trees as a result of thinning would facilitate/accelerate attainment of large diameter trees, which would be available as larger diameter snags in the future. High density snag patches and concentrations of down wood would be available in the 15 percent unmanaged retention areas of each harvest activity unit. In addition, some alternatives would provide for snag recruitment with management activities. These pockets of unmanaged stands along with stands outside the treatment units serve as blocks of available nesting habitat for the woodpecker guild.

**Pileated woodpecker effects**

The Viable Ecosystem program determined 1,417 acres of suitable pileated woodpecker habitat in the analysis area. All four action alternatives propose thinning (commercial, none, and small diameter), slash removal, and underburning activities in Viable Ecosystem-defined nesting habitats. In Alternative D there is a group selection to remove severely mistletoe-infected trees, including those 21 inches and greater, while creating 2-5 acres openings. Alternative E removes all severely infected trees 21 inches and below, while inducing mortality in infected trees 21 inches and greater, thus providing recruitment of snags for potential nesting habitat. Alternatives B, C, and E all retain larger diameter trees on the landscape. Alternative C provides the most potential nesting habitat in year 2018 and 2058 (Table 51). This alternative keeps the most canopy cover needed for pileated woodpeckers through less thinning, deferred lodgepole treatment, and retained decadent lodgepole stands. The majority of the suitable habitat in the Rim-Paunina analysis area is on Walker Rim.

Planned activities would likely reduce canopy cover post-harvest and not have the dense conditions preferred by this species. However, the tree species that have potential to achieve the largest diameters (ponderosa pine and Douglas-fir) would be favored tree species for retention as they are more fire tolerant. This would benefit the species within several decades as canopy cover returns, returning stands to nesting and foraging habitat. Modeling for all action alternatives showed an increase in tree growth and vigor over projected 2018 and 2058 modeled timeframes, contributing to improved habitat with larger diameter snags and down logs available than under a passive management scenario. Viable Ecosystem modeling determined an increase in pileated woodpecker habitat in all alternatives for projected years 2018 and 2058. Alternative B increased habitat to 4,897 acres by 2058, Alternative C to 4,959 acres, Alternative D to 4,928 acres, and Alternative E to 4,830 acres (Table 51). While project activities may result in some short-term disturbance during implementation that may result in some pairs being

temporarily relocated, the long-term (50 years) habitat trend would indicate an increase in suitable habitat that could support a population increase.

**Williamson sapsucker and northern flicker effects**

Because each of these species is more closely associated with open canopied forests, proposed activities such as thinning, both commercial and non-commercial, removal of slash, and underburning would promote more favorable overall habitat conditions. All four action alternatives propose thinning, slash removal, and underburning activities in Viable Ecosystem-defined nesting habitats. In Alternative D there is a group selection to remove severely mistletoe-infected trees, including those 21 inches and greater, while creating 2-5 acres openings. Alternative E removes all severely infected trees 21 inches and below, while inducing mortality in infected trees 21 inches and greater, thus providing recruitment of snags. Alternatives B, C, and E all retain larger diameter trees on the landscape. Alternative B management activities include 163 acres (15 percent) of nesting habitat for the Williamson sapsucker and 303 acres (20 percent) of northern flicker nesting habitat. Alternative C and D management activities include 613 acres (56 percent) of nesting habitat for the Williamson sapsucker and 697 acres (45 percent) of northern flicker nesting habitat. Alternative E management activities include 633 acres (58 percent) of nesting habitat for the Williamson sapsucker and 731 acres (47 percent) of northern flicker nesting habitat. For Alternative E, induced tree mortality of severely infected large trees would add to snag recruitment providing nesting habitat. All existing snags would remain except for temporary road construction, log landings, and occupational safety.

The Viable model predicted an increasing trend in suitable habitat acres over projected years 2018 and 2058 (Table 52 and Table 53). For both the Williamson sapsucker and northern flicker, modeling determined an increase in the amount of nesting acreage for each alternative greater than the no-action alternative. Alternative E results in the most potential nesting habitat for Williamson sapsucker in 2018 and Alternative B for northern flicker (see explanations of alternatives under Table 52 for Williamson sapsucker and Table 53 for the northern flicker). The Williamson sapsucker and northern flicker are projected to gain the most nesting habitat through Alternative B by year 2058 (1,829 acres of habitat for Williamson sapsucker and 2,397 acres for northern flicker), increasing nesting habitat over 1,400 acres compared to Alternative A, the no action alternative. However, all other action alternatives are within 100 to 200 acres. Based on the habitat modeling, there would be habitat to support an increase in population for the flicker and Williamson sapsucker, regardless of the alternative selected for implementation.

Altman (2000) in the Landbird Conservation Strategies for the East-Slope Cascades recommended the retention of at least one snag/acre at least 12 inches in diameter in mixed-conifer stands or at least 18 inches in diameter in ponderosa pine stands for Williamson sapsuckers. The Project Design Features and mitigation measures in Chapter 2 prescribe even higher levels. The Rim-Paunina project is consistent with Altman's recommendations.

**Hairy and downy woodpecker and red-naped sapsucker effects**

Viable Ecosystem modeling was not conducted for the hairy and downy woodpeckers or red-naped sapsucker. There would be no adverse effects to the downy woodpecker or red-naped sapsucker because of their close association with riparian habitats in the long-term. For the short-term, depending on the alternative there are 12 or 13 units (Unit no. 5, 6, 10, 15, 20, 25, 30, 80, 85, 90, and 110 for all alternatives; Unit 95 for Alternatives B and E; and unit 3005 for Alternatives C, D, and E) proposed for treatment within the Five Mile Draw drainage. The objective is to restore riparian function and improve vigor of riparian-associated vegetation. Additionally Unit no. 621 treatment is intended to enhance aspen stands. For the hairy woodpecker which utilizes mixed conifer, deciduous, and ponderosa pine forests there would be minimal short- or long-term effects to the species. In the short-term temporary disturbance to nesting pairs may occur during the breeding season from harvest operations and prescribed

underburning. This disturbance is considered small scale compared to nesting habitat available in the entire 40,000 acre watershed. The intensity of disturbance is also considered low because not all activities would occur at the same time and it would last from 1-5 years in duration. Retention of snags and down logs is specified in the Project Design Features in Chapter 2. In the long-term, aspen enhancement of Unit No. 621 would provide increased deciduous nesting habitat.

Marshall et al. (2003) reported findings on population trends for the hairy woodpecker, northern flicker, pileated woodpecker, and the downy woodpecker. They have experienced non-significant declines over the last several decades based on Breeding Bird Surveys. Marshall et al. also reported that the Williamson sapsucker population was stable as reported in most of the studies they reviewed. Rim-Paunina implementation should not result in any short- or long-term decline in populations to any of these species.

**Cumulative Effects**

Table 19 was reviewed for actions that have a similar zone of influence and overlap in time and space with the Rim-Paunina project. The zone of influence for this group of woodpeckers is defined as the Rim-Paunina analysis area, which encompasses the 40,000 acre Little Walker Watershed, which is large enough to provide multiple pair home ranges for each of the woodpecker species. The projects from Table 19 listed as "completed" no longer have any effects that are quantifiable. No ongoing or current projects overlap with the project area.

Snag density on private land in the project area is assumed to be low because most landowners want to reduce wildfire potential on their land. Consequently, snag habitat is likely limited and may not be available to woodpeckers for very long and would not contribute to nesting populations. The new Gilchrist State Forest that abuts the project area has a stated objective "to maintain the forestlands as managed/working forests and conserve forestlands that could be lost to parcelization and/or development." [20] Activities would focus on developing an integrated management plan for recreation, sustainable forestry, and wildlife habitat. Forest management activities would match the Eastern Oregon Regional Forest Management Plan which would likely thin overly dense young forests in the first decade.

There are no foreseeable actions that have potential to reduce suitable habitat for any of these woodpecker species. With project implementation, nesting habitat present in the analysis area would not result in a long-term decreasing trend for the woodpecker guild species. There are no additive actions occurring since November 2004 with the potential to alter habitat in the project area. No additive cumulative effects to the woodpecker guild are projected.

**Conclusion**

For the state of Oregon, the Oregon State Heritage Program 2011 lists the hairy, downy, and pileated woodpeckers and red-naped sapsucker as S4, 'Apparently Secure'. NatureServe (2011) listed the following as the top five major threats afflicting pileated woodpeckers (1) conversion of forest habitats to non-forest habitats, (2) short rotation, even-age forestry, (3) monoculture forestry, (4) forest fragmentation, and (5) removal of logging residue, downed wood, and pine straw that would ultimately put nutrients back into the ecosystem and provide foraging substrate. For hairy woodpeckers possible local declines may result from usurpation of nest cavities by house sparrows or starlings. The Williamson's sapsucker is listed as S4B, 'Apparently Secure' for breeding populations and S3N, 'Vulnerable' for nonbreeding populations (NatureServe 2011). This ranking differs from the 2008 S5 'Secure' listing, there were no reasons given for the declines. Northern flickers are ranked as S5, 'Secure' (NatureServe 2011).

[20] State of Oregon Staff Analysis of the Proposed Acquisition, November, 2009

Rim-Paunina mitigation measures and Project Design Features would restrict snag removal to timber sale landings, temporary road construction, and those deemed a safety hazard to forest workers. In Rim-Paunina all action alternatives do not permit the removal of snags from the landscape. In Alternative E, the induced mortality of severely mistletoe-infected trees 21 inches and over would add to the recruitment of snags, creating nesting habitat for all woodpecker guild species. Because of project mitigation measures, Project Design Features, and retention of 15-20 percent of acres as untreated in treatment units, the Rim-Paunina project does not contribute to any change in the viability of the woodpecker guild within the project area.

No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on district there are no cumulative effects. Modeled potential nesting habitat for 2018 (post project-implementation) increases for the pileated woodpecker, Williamson sapsucker, and northern flicker. However, modeled northern flicker potential nesting habitat decreases in projected year 2058 because stand and canopy cover may become more dense due to lack of vegetation management. This could be because of increased stand density due to lack of vegetation management. The project area is only a 13 percent of the entire Crescent Ranger District, which is only 22 percent of the Deschutes National Forest. Recent Deschutes National Forest analysis shows there are 178,480 acres of modeled nesting habitat for the pileated woodpecker, 243,364 acres for Williamson sapsucker, 219,576 acres for the northern flicker, 507,921 acres for the hairy woodpecker, and 1,330 acres for the downy woodpecker. This analysis incorporates all past management activities forest wide. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the woodpecker guild.

**Red-tail Hawk**

**Ecology**

Red-tail hawks are widely distributed across North America and winter from southern Canada south into the United States and Central America. The red-tail hawk has increased in numbers and expanded its range since Euro-American settlement (Marshall et al. 2003). While it was selected as a Management Indicator Species for large trees in mixed habitat, it uses any habitat that has perches to hunt from and is open enough to capture its prey on the ground. Small mammals, such as rabbits, hares, and mice provide the bulk of their diet. They are also known to capture birds, reptiles, and amphibians. Red-tails use a wide variety of structures for nests, including trees, utility poles and cliffs (Marshall et al. 2003). They place their nests higher in trees than other raptors, and generally select larger trees or smaller deformed trees where branch structure supports this higher placement. Red-tailed hawks are ranked S5, 'Secure' in Oregon (NatureServe 2011).

**Existing Condition**

No Viable Ecosystem analysis was done for the red-tailed hawk because the species is a habitat generalist as long as trees are present and capable of supporting a nest structure. Red-tail habitat consists of large snags or deformed trees, open country intersperse forests, and suitable perches (e.g. trees, utility poles, outcrops etc.). They are known to use agricultural land, clearcuts, grasslands, woodlands and alpine environments (Marshall et al. 2003). District wildlife sighting records list thirty-one red-tail hawk observations and 10 nests scattered across the analysis area, of which only seven were observed active and three were noted as inactive. Private forestlands in the analysis area (106 acres) are not managed for red-tail hawks, although scattered large, overstory ponderosa pine may provide nest sites. However, any nesting capability for red-tail hawks on private forested lands would be incidental and would not be expected to persist for the long-term.

The Three Trails OHV EIS was reviewed for literature research conducted to ascertain OHV effects on the red-tailed hawks, if any (Three Trails OHV FEIS 2010). The existing and potential disturbance assumption was disturbance would continue within the road effect zone (200 meters each side of roads or

motorized trails) for the OHV travel system. Decreased habitat quality, reduced reproductive potential, and avoidance of the road effect zone are potential effects as a result of physical habitat alteration or disturbance. Disturbance would decrease beyond the road or motorized trail effect zone and as a result, habitat quality and amount would increase.

The majority of the existing roads and trails in the project area have been in place for several decades and some level of habituation to motorized traffic has probably occurred for nesting red-tailed hawks. Flecher at al. (1999) conducted a raptor study in Colorado riparian corridors, which included some corridors with recreation trails. They found red-tailed hawk abundance was similar from the controlled sites to the trail sites. They concluded red-tailed hawks seem to tolerate human activity along the recreational trails. Janes (1984) in a red-tail study in Wasco County, Oregon reported that normal human activity did not affect red-tailed hawk reproductive success. He also concluded that the presence of dwellings or frequently travelled roads and the locations of nests near roads had no significant effects and that compensation for normal human activities was not necessary for estimates of reproductive success. Other studies stated human activity near a nest site (e.g. walking around or stopping vehicles) has more of an effect than OHVs riding by a nest (Lee 1981; Skagen 1980; Holmes et al. 1993; Burger and Gochfeld 1998 pages 151, 220, 222 and 223; Gill et al. 1996).

## *Environmental Consequences*

**Direct and Indirect Effects**
**Alternative A**
With the selection of Alternative A, there would be no effect on red-tailed hawk nesting habitat. There would be recruitment of additional acres into nesting status as younger managed stands develop the age and structure requirements red-tails select for nesting. However, in the long term the continuation of mistletoe infection and beetle infestation throughout the landscape could lead to tree mortality. Additionally, the risk of stand replacement events would continue to increase as well.

This alternative would have no immediate direct effect on red-tailed hawk potential nesting habitat. In the short-term, the existing habitat would be occupied with pair territories in the planning area. Younger aged stands that have resulted from past regeneration timber harvest have the capability to develop into suitable nesting habitat, because these species would use relatively small diameter trees for nesting purposes. The long-term poses the greatest potential for stands to lose their desired nesting character from reduced stratified structure and canopy cover as a result of mortality from a disturbance event (i.e. mistletoe infection, beetle infestation, or fire events).

**Effects Common to All Action Alternatives**
All active management alternatives propose activities within stands with trees large enough to provide nest structure for red-tail hawks. Alternative B proposes 12,036 acres of commercial thinning, non commercial thinning and improvement cuts with underburning treatments in the Rim-Paunina project area. For Alternatives C and D there are 14,780 acres of management treatments including commercial and non-commercial thinning, slash removal, small diameter thinning, mastication, and prescribed underburning, which would be conducted primarily in ponderosa pine dominated stands. In addition, Alternative D also includes group selection in severely dwarf mistletoe infected stands, creating 2-5 acre openings with removal of infected trees, including those over 21 inches in diameter, and planting ponderosa pine seedlings in the openings. For Alternative E, 16,221 acres of proposed treatments include slash removal, small diameter thinning, mastication, and prescribed underburning, as well as 1,921 acres of alternative mistletoe treatment, in which all infected trees under 21 inches in diameter would be removed and mortality in infected trees over 21 inches would be induced. These trees would stay on the landscape as snags, eventually adding to the down wood component on the landscape. Treatment of

severely infected stands would provide a more healthy resilient forest, with larger trees in which red-tails can use in the long term.

Because red-tailed hawks are not known to require dense multi-layered stands for nesting, the commercial thinning and fuels reduction activities in all action alternatives would not affect nesting habitat and there would be no difference between alternatives. Residual stands would be more likely to sustain large trees over the longer term. Project implementation of live tree removal would focus on trees less than 21 inches in diameter. However, Alternatives D and E slightly reduce the amount of large live trees by thinning or killing severally mistletoe infected trees 21 inches and over.

Stand density reduction, especially in removing trees less than 21 inches in diameter would tend to provide more foraging habitat for this species by opening up stands, allowing greater access to the forest floor to capture prey. Retaining the largest trees with the largest diameter limbs would also be beneficial in maintaining nesting capability in forested stands. Project Design Features and mitigation measures (Chapter 2) have been provided to protect active nest sites during the nesting season by prohibiting disturbing activities such as timber harvest, temporary road construction, and fuel reduction activities.

Multiple treatment units are located within a quarter mile of a red-tailed hawk nest. If the nests are occupied, a seasonal restriction would apply March 1st –August 31st for all implementation activities that disturbs the nesting hawks (Chapter 2). For Alternative B, treatment units within a quarter mile are: 5, 6, 665, 685, 690, 775, 800, 805, 875, 876, 880, and 945. For Alternatives C, D, and E units within a quarter mile are: 5, 6, 665, 685, 690, 775, 800, 805, 875, 876, 880, 905, 930, 945, 3005, 3010, 3020, 3025, 4025, 4030, and 4035.

**Cumulative Effects**

Table 19 in Chapter 2 was reviewed for past and current vegetation management projects with the potential for additive effects that would overlap in space and time with those of the Rim-Paunina project. The zone of influence is defined as the 40,000 acre Little Walker Watershed because it is a large enough area to support multiple home ranges. There are no projects which overlap with the Rim-Paunina project area.

Project implementation is not expected to lead to a loss in pair territories in the analysis area or across the Crescent Ranger District. Therefore, no cumulative effects to the red-tailed hawk are projected.

**Conclusion**

In the state of Oregon, the red-tailed hawk is listed as S5 'Secure' through the Oregon Natural Heritage program (NatureServe 2011). Rim-Paunina project mitigation measures protect and maintain raptor nesting habitat in the following ways: (1) seasonal restriction within a ¼ mile of a known nest site, (2) 15-20 percent retention of untreated habitat within treated acres as well as untreated suitable nesting habitat within the project area, and (3) treating stands to be resilient to disturbance, such as wildfires, insect, and disease. From literature research, red-tailed hawks seem to tolerate human activity along recreational trails (Flecher et al. 1999, Janes 1984, Three Trails OHV FEIS 2010).

Red-tailed nesting habitat is located on federal lands and is prevalent in and around the project area. The combination of insect, disease and wildfires, is expected to reduce the acreage of potential red-tailed hawk nesting habitat on the Deschutes National Forest in the absence of management. In general, prescriptions for vegetation manipulations promote and maintain nesting habitat by retaining the largest diameter trees during harvest operations and opening stands to allow larger limb to grow for nesting. Rim-Paunina prescriptions promote more resilient nesting habitat by treating infected and diseased stands as well as stands that exceed HRV. In the short term, project implementation would also reduce habitat. However, in the long term these actions would provide suitable more resilient nesting habitat that would

continue to develop, per Reynolds et al. (1992), and reduce risk of loss from a wide-scale disturbance. The Rim-Paunina project analysis does not show short- or long-term red-tailed hawk population change. Rim-Paunina would enhance habitat for red tail nesting and foraging on the Crescent Ranger District.

This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on the Crescent Ranger District there are no cumulative effects. Red-tailed are habitat generalists, keying in on large diameter trees for nesting. The Rim-Paunina project is not removing large trees, except in Alternative D. Alternative D proposes to harvest severely mistletoe-infected trees over 21 inches. Alternative E induces tree mortality in trees 21 inches and over, but the trees will stay on the landscape. The project area is only a 13 percent of the entire Crescent Ranger District, which is only 22 percent of the Deschutes National Forest. Recent Deschutes National Forest analysis shows there are 192,492 acres of modeled nesting habitat for the red-tailed hawk. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the red-tailed hawk.

**Osprey**

**Ecology**

Ospreys are good biological indicators of ecosystem health, because they are long-lived and are the top predator of aquatic food webs (USGS 2005). Various fish species comprise 99 percent of their diet. Ospreys dramatically declined in abundance through the mid-1970s, as a side effect of pesticide use, but have since recovered and become a common nesting species along the Columbia and Willamette waterways in western Oregon (USGS 2005). They nest within two miles of fish bearing bodies of water and generally nest in larger broken top live trees or snags, but also utilize utility poles, man-made Canada goose nest boxes, channel markers and other manmade structures where natural structures are lacking (Marshall et al. 2003). The primary habitat requirements of osprey include a dependable source of fish that can be captured near the surface and an elevated nesting platform within a few kilometers of their food supply. Ospreys are migratory, typically arriving on the Crescent Ranger District in April and May and staying into early autumn until fall migration. While a pair would mate for life, they migrate separately and re-unite at their nest site the following spring. The birds winter from central California south into Central and South America. They are currently ranked as S4 in Oregon, 'Apparently Secure' (NatureServe 2011). NatureServe (2011) listed the following as major threats to ospreys: (1) pesticides, (2) gunshots, (3) steel traps, (4) impact with or electrocution by high-tension wires, and (5) being caught or drowned in nets (Wiemeyer et al. 1980 cited in Henny and Anthony 1989).

**Existing Condition**

There are at least 40 known osprey nests on the Crescent Ranger District, although none are located in the Rim-Paunina analysis area. The greatest concentration of nests are found west and north of Davis Lake, but there are also several nests along the shoreline of Odell Lake, all of which are outside the Rim-Paunina planning area. Within the planning area there are no osprey observations or known nests as of February 2012. The lack of nest data in the project area is likely a result of most of the land base being greater than two miles away from an adequate food base to support a nesting pair and young in the analysis area (i.e. fish bearing bodies of water) (Marshall et al. 2003). There are no major streams or rivers that could support enough fish or fishable waters to sustain a pair.

## *Environmental Consequences*

**Direct, Indirect and Cumulative Effects**

**Effects and Conclusion**

There is no indication as of February 2012 that nesting ospreys are present in the 40,000 acre analysis area. The Rim-Paunina project area does not encompass any major streams or rivers that could support

enough fish or fishable waters to sustain an osprey pair. Therefore, the selection of any action alternative is unlikely to have any adverse effect on ospreys and direct, indirect, or cumulative effects are not expected to occur. If an active nesting pair became known during sale activities or post-sale work, project design features and mitigation measures are in place to protect the nest site.

Table 19 in Chapter 2 was reviewed for past and current vegetation management projects with the potential for additive effects that would overlap in space and time with those of the Rim-Paunina project. The zone of influence is defined as the 40,000 acre Little Walker Watershed because it is a large enough area to support multiple home ranges. There are no projects which overlap with the Rim-Paunina project area.

The osprey is listed as S4, 'Apparently Secure', statewide in Oregon (NatureServe 2011). For the Rim-Paunina project area there are no direct or indirect effects identified with implementation of any proposed alternative. There is no osprey habitat within the project area. There is no overlapping ongoing or current projects within the Rim-Paunina area, thus there are no cumulative effects on osprey habitat. The Rim-Paunina project would not contribute to a change in viability in the Rim-Paunina project area.

This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on the Crescent Ranger District there are no cumulative effects. There is no osprey habitat within the Rim-Paunina project area. Recent Deschutes National Forest analysis shows there are 496,233 acres (275,697 with required structure) of modeled nesting habitat for the osprey. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the osprey.

**Great Gray Owl**

**Ecology**

This species is associated with mature stands of mixed conifer/lodgepole pine/mountain hemlock near meadow complexes. Great gray owls do not build their own nests, but rely on other raptor nests, mistletoe platforms, broken topped snags, or artificial nest platforms. Bull and Henjum (1990) found that great gray owls tended to nest in unlogged, mature or older stands with a fairly open understory and dense overstory (60 percent or greater). In a study that included portions of the Deschutes National Forest south of LaPine, Oregon, Bryan and Forsman (1987) determined canopy cover at 11 nest sites ranged from 15-70 percent with a mean of 46.5 percent. Great gray owls have been documented using alternative nest sites and may nest more than 0.5 mile from the previous years nest (Bull and Henjum 1990). Bryan and Forsman suggested that forest/meadow associations are a preferred habitat. In fact, their research located 63 sites with great gray owls, of which 60 sites were in forests less than 0.3 km from meadows and three were in forest areas 0.30-0.8 km (0.2 - 0.5 miles) from the nearest meadow. Fifty-nine sites were dominated by lodgepole pine or mixtures of lodgepole pine and ponderosa pine. Four sites were in mixed coniferous forests. Bryan and Forsman stated all sites where great gray owls were located were in old-growth (45 sites) or mature (15 sites) habitat characterized by large overstory trees. They defined old-growth lodgepole pine as any stand greater than 70 years of age and old-growth ponderosa pine or mixed coniferous forests as any stand over 200 years of age. Elevations at occupied sites ranged from 1,270 to 1,650 meters (4,167 to 5,413 feet), although great gray owls have been documented to occur at elevations up to 1,890 meters (6,200 feet) in eastern Oregon.

Home ranges for breeding adults in northeastern Oregon averaged 1,112 acres and ranged from 324 acres to 1,606 acres, although they have been observed foraging up to two miles from the nest (Bull and Henjum 1990). Foraging habitat is typically defined as natural meadows greater than 10 acres in size, riparian areas, and clear-cut or selectively logged areas where they forage on voles, pocket gophers, shrews, chipmunks, squirrels, and snowshoe hares.

**Existing Condition**
From a global perspective, great gray owl populations are S5, 'Stable', but the Oregon State Heritage Program rates the great gray as S3, 'Vulnerable', for the state of Oregon (NatureServe, 2011). Reasons as to why they are listed as 'Vulnerable' were not given. However, the Interior Columbia Basin Ecosystem Management Project found populations to be widely distributed, although at low levels. Since 1995, surveys conducted to Region 6 protocol have shown available nesting habitat to be found in wider bands of elevation as more nests are found region-wide.

As of January 2012 there are no known nests within the Rim-Paunina project area. The one known nest on the district is by Refrigerator Creek outside of the project area. Other observations or vocalizations of great grays have been documented within the Three Trails OHV project area, along the Little Deschutes River, in Big Marsh, and in the Five Mile Draw drainage north of Highway 58, within the project area.

**Direct and Indirect Effects**
**Alternative A – No Action**
This alternative would result in no immediate change in habitat conditions for great gray owls in the planning area. Nesting habitat in the planning area would be maintained in late- and old- structure stands with broken topped trees and/or where other raptors have created stick nests suitable for great gray owl nesting use. However, this alternative would be at the greatest risk to a disturbance event that could remove the largest trees and suitable nesting habitat. Stands would continue to exceed HRV, thus increasing the risk for a stand replacement event. Additionally, meadows and open areas used by great gray owls and their prey species would become encroached upon by lodgepole pine, thus reducing habitat.

**Effects Common to All Action Alternatives**
Table 57 displays projections of suitable great gray owl nesting habitat by alternative over time. Although habitat acres are projected to increase in Alternative A, the no-action alternative, the resulting stand left untreated would be more susceptible to infection, infestation, and fire events when compared to Alternatives B-E. Action alternative acreage amounts increase over time as a result of expected increase in tree vigor from thinning, reducing overcrowded stands, fuel loading, and the probability of advancing stands to the next successional stages. In the action alternatives, analysis for projected years 2018 and 2058 show an increase in great gray nesting habitat when compared to the existing condition.

**Table 57. Viable Ecosystem Modeling Projection of Great Gray Owl Nesting Habitat Acres over Time within the Rim-Paunina Project Area (National Forest System Lands Only)**

| Alternative | Great Gray Owl Nesting Habitat Acres | | |
|---|---|---|---|
| | 2010 Pre-Treatment | 2018 Projection | 2058 Projection |
| **A** | 6,173 | 8,626 | 17,865 |
| **B** | 6,173 | 9,171 | 18,009 |
| **C** | 6,173 | 9,170 | 18,165 |
| **D** | 6,173 | 8,923 | 17,615 |
| **E** | 6,173 | 8,835 | 17,049 |

Treatments are projected to improve nesting and foraging habitat within the Rim-Paunina project. Bull and Henjum (1990) stated partial cuts are generally suitable foraging habitat because the stand is open

enough for maneuvering, adequate perches are available, and dead and down material should be left for cover for voles.

Underburning operations are proposed in the ponderosa pine Plant Association Group to reduce needle cast and small diameter down wood less than three inches in diameter. Burning may also reduce the number of small diameter lodgepole and ponderosa pine present in each unit; however, Project Design Features in Chapter 2 were incorporated into the alternatives to retain snags and down wood. Also, prescribed burning would be accomplished in a mosaic pattern with unburned areas within the burn, in addition to unburned designated leave areas. It is assumed, after timber harvest and fuels activities that post-harvest canopy cover levels would range from 20-25 percent in the lodgepole PAG and 30-35 percent in the ponderosa and mixed conifer PAGs. These percentages would be below those described by Bull and Henjum (1990) as suitable nesting conditions and below the average described by Bryan and Forsman (1987) in their south central Oregon study. While nesting capability would be reduced, active forest management would reduce stem densities and improve great gray owl foraging opportunities because visibility and access to the ground for prey capture would be enhanced.

For all treatment units, retention of at least 15 percent for passive management is required. Passive management on areas adjacent to thinning activities would maintain sufficient nesting habitat. There would be no long-term effect on the great gray owl's ability to successfully locate suitable nest platforms and adjacent foraging areas if nesting habitat is maintained over the long-term in the planning area. Bull and Henjum (1990) also state that managing habitat for northern goshawks would provide nest sites over time for great gray owls because the owls used old goshawk nests more than any other type of nest in their northeastern Oregon study sites. If active nest sites are discovered from future survey efforts, Project Design Features and mitigation measure would ensure nest stands would be protected from harvest activities and seasonal restrictions placed on disturbing activities as needed.

In all action alternatives, Unit #621 is proposed for aspen treatment. Five openings, up to two acres in size, would be created and restoration of aspen and willow would occur. The openings would be scattered in the unit, located adjacent to existing aspen patches and within small moist micro climate draws suitable for aspen growth. Aspen and willow regeneration would be managed by prescribed fire, root cutting, and/or planting. To protect these openings from browsers, wood, metal, or plastic fence would surround the openings and trapping of gophers may also be required for aspen growth. The remainder of the unit would be thinned following the HTH treatment guidelines (Chapter 2).

The thinning and aspen enhancement would create more suitable foraging and nest habitat for great gray owls. Thinning the unit and establishing opening results in easier foraging grounds, with more accessibility to prey species. Over time the unit would return to an aspen-willow wet meadow, which can be nesting habitat for great gray owls (Marshall et al. 2003; Riper et al. 2006; Hayward and Verner 1994; Duncan 1997). Additionally, reducing stand density allows for larger trees to grow creating potential nest trees.

**Cumulative Effects**

Table 19 in Chapter 2 was reviewed for past and current vegetation management projects with the potential for additive effects that would overlap in space and time with those of the Rim-Paunina project. The zone of influence is defined as the 40,000 acre Little Walker Watershed because it is a large enough area to support multiple home ranges. There are no projects which overlap with the Rim-Paunina project area, thus there are no cumulative effects.

**Conclusion**

In the state of Oregon, the great gray owl is listed as S3 'Vulnerable' through the Oregon Natural Heritage program.

Rim-Paunina Unit #621, an aspen enhancement treatment unit, would increase habitat in meadow and riparian areas by reducing stand densities and restoring native vegetation. In addition, the Rim-Paunina project includes mitigation measures to protect and maintain nesting habitat in the following ways: (1) seasonal restriction within a ¼ mile of a known nest site, (2) 15-20 percent retention of untreated habitat within treated acres as well as untreated suitable nesting habitat within the project area, and (3) treating stands to be resilient to disturbance, such as wildfires, insect, and disease.

This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on the Crescent Ranger District there are no cumulative effects. Project implementation would increase great gray owl potential nesting and foraging habitat. Recent Deschutes National Forest analysis shows there are 197,847 acres of modeled nesting habitat for the great gray owl. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the great gray owl.

**Great Blue Heron**

**Ecology**

The great blue heron is one of the most wide-spread waterbirds in Oregon (Marshall et al. 2003). For the state of Oregon, the Oregon State Heritage Program rates the great blue heron as S4, 'Apparently Secure' (NatureServe 2011). It is highly adaptable and is found along estuaries, streams, marshes and lakes throughout the state. Nest locations are in the proximity of available food. They nest in colonies, rookeries, in shrubs, trees and river channel markers where there is little disturbance (Marshall et al. 2003). Tree species they would utilize in the analysis area include ponderosa pine and Douglas-fir. While the average preferred diameter of nest trees is 4.5 feet, they use a wide range of sizes from 1.5 to 6 feet in diameter (Marshall 2003). They hunt around shallow waters of lakes and streams, and wet or dry meadows, feeding on fish, amphibians, aquatic invertebrates, reptiles, mammals and birds. Foraging habitat on the Crescent Ranger District includes the shallow water of Davis Lake, Odell Creek, Ranger Creek and their associated marshes and riparian habitat, which are outside the Rim-Paunina analysis area.

**Existing Conditions**

Habitat for the great blue heron on the Crescent Ranger District includes meadows, streams, lakes, and wetlands. Colony nesting trees on the Crescent Ranger District include western hemlock, ponderosa pine and Douglas fir. There are no district records of great blue herons in the Rim-Paunina planning area. Also, there are no known active heron rookeries or colony nesting in the project area and only one documented rookery on the Crescent District, located in the Moore Creek drainage west of Davis Lake, outside the project area. This site however, has not been active since 2003 when nesting red-tailed hawks moved into the rookery.

**Direct, Indirect and Cumulative Effects**

**Effects Common to All Alternatives**

There are no activities planned within riparian areas that would have the capability to affect wetland habitat which provides foraging habitat for the great blue heron. There are no documented observations of great blue herons along the riparian systems in the analysis area. There are no anticipated direct or indirect effects to the species. During project implementation, if a heron rookery is discovered, an evaluation would occur to determine if activities have the potential for nesting disturbance and a limited operating restriction period attached as needed (Project Design Feature, Chapter 2). Restriction would apply to activities located within ¼ mile of the rookery, and may include timber harvest, road construction, underburning and small-tree thinning or any combination of the above depending on the site conditions. Because there are no known nest sites (rookeries) within the project area, nesting disturbance would not be an issue with the selection of any alternative including the No Action alternative.

Table 19 in Chapter 2 was reviewed for past and current vegetation management projects with the potential for additive effects that would overlap in space and time with those of the Rim-Paunina project. The zone of influence is defined as the 40, 000 acre Little Walker Watershed because it is a large enough area to support multiple home ranges. There are no projects which overlap with the Rim-Paunina project area.

Since there is no activity in riparian areas that could be possible habitat for the great blue heron and there are no overlapping projects with the Rim-Paunina analysis area, there would also be no cumulative effects.

**Conclusion**
For the state of Oregon great blue herons are listed as S4, 'Apparently Secure' (NatureServe 2011). Great blue heron need a permanent wetland for nesting habitat, within the project area there are only a few intermittent streams and wetlands. Within the Rim-Paunina project area, there is no nesting habitat that can support great blue heron, nor are there any known active rookeries within the Rim-Paunina project boundary.

This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on the Crescent Ranger District there are no cumulative effects. There is no wetland habitat that can support great blue heron nesting habitat within the Rim-Paunina project boundary. Recent Deschutes National Forest analysis shows there are 210,194 acres of modeled nesting habitat for the great blue heron. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the great blue heron.

**Waterfowl**
**Existing Condition**
There are no ponds, lakes or reservoirs within the Rim-Paunina project area, thus limiting possible habitat and waterfowl abundance. Additionally, there are only a few unnamed intermittent streams and wetlands, mainly located in the western portion, which provide scant amounts of habitat. Moreover, there are no district records for any waterfowl within the project boundaries, as of February 2012.

**Direct and Indirect Effects**
**Effects Common to All Alternatives**
There is no proposed project work within riparian reserve zones that could influence waterfowl species that require tree cavities for nesting or those that nest on the ground near water sources. Therefore there are no direct or indirect effects to waterfowl.

**Cumulative Effects**
Table 19 in Chapter 2 was reviewed for past and current vegetation management projects with the potential for additive effects that would overlap in space and time with those of the Rim-Paunina project. There are no projects which overlap with the Rim-Paunina project area. Since there is no nesting habitat for waterfowl in the Rim-Paunina project area and no overlapping projects with the Rim-Paunina analysis area, there would are no cumulative effects for waterfowl.

**Conclusion**
The majority of the waterfowl habitat on the district occurs in Big Marsh and Davis Lake outside the project area. The Rim-Paunina project includes only a small amount of intermittent riparian and stream habitat when compared to the contribution of lakes, larger rivers, and wetlands forest wide. There are no district records of waterfowl within the Rim-Paunina project area. Waterfowl need a permanent source of

water (i.e. stream or wetlands) to nest. Thus, project activities do not propose any change within nesting habitat.

This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on the Crescent Ranger District there are no cumulative effects. Nesting waterfowl habitat is located outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of waterfowl.

**Golden Eagle**

**Ecology**

Gilligan et al. (1994) describes the golden eagle as an uncommon to fairly common summer resident in open country east of the Cascade Mountains and a very uncommon summer resident high in the Cascades. The golden eagle nests in open large (greater than 30 inches in diameter) live ponderosa pine or cliff ledges that support its 3-10 foot tall nest (Marshall et al. 2003).

In the state of Oregon, the golden eagle is listed as S4 'Apparently Secure' through the Oregon Natural Heritage program (NatureServe 2011).

**Existing Condition**

Because the majority of the analysis area is dominated by forested stands with two or three canopy layers of live trees, open country suitable for nesting and foraging is very limited for this species. The Viable Ecosystem analysis was completed and showed approximately 269 acres are present in the Rim-Paunina analysis area with trees greater than 30 inches in diameter that would be suitable for the golden eagle.

District wildlife records list eleven golden eagle sightings across the entire district, four within the analysis area. Of these four, two were dead eagles along Highway 58 the other two were live sightings along Highway 97, one in a perch tree and one feeding on a deer carcass. It is unknown if there is enough open habitat present in the analysis area for a golden eagle territory based on Viable Ecosystem modeling. There are no known golden eagle nests in the project area. For the state of Oregon, the Natural Heritage program ranks golden eagles as S4, 'Apparently Secure' (NatureServe 2010). NatureServe (2010) listed the following as the major threats golden eagles experience: (1) powerline electrocution because wings can span phase-to-phase or phase-to-ground wires (Biosystems Analysis 1989), (2) poison intended for coyotes, (3) occasional shootings, and (4) habitat loss to agriculture and suburban land uses.

**Effects Common to All Alternatives**

The selection of any alternative would have no current direct or indirect effect on the golden eagle since there are no known nests within the project area. In each action alternative, treatments units that open the stand and understory allowing for large diameter trees to grow would eventually (over several decades) provide more habitat conducive to the golden eagle. Golden eagles have been known to nest in large, over 30 inches in diameter, live ponderosa pines with sturdy open branches (Marshall et al. 2003). Foraging habitat is limited to open habitat with a shrub component that provides food and shelter for their prey. The prescriptions proposed would not remove trees greater than 30 inches diameter described by Marshall et al. (2003) as potential nest habitat structure, except for a few trees in Alternative D which may be removed in order to address mistletoe infection.

In the event that nesting golden eagles are discovered in the project area and would be affected by the project, project mitigation measures and Project Design Features would protect the nest site (Deschutes Land and Resource Management Plan WL-2 and WL-3; page 4-52). These measures have been used as routine on the Forest and have been proven to be effective. Since no short- or long-term golden eagle

population decrease would occur as a result of Rim-Paunina implementation, no direct or indirect effects are anticipated.

**Cumulative Effects**
Table 19 in Chapter 2 was reviewed for past and current vegetation management projects with the potential for additive effects that would overlap in space and time with those of the Rim-Paunina project. The zone of influence is defined as the Little Walker Watershed because it is a large enough area to support multiple home ranges. There are no projects which overlap with the Rim-Paunina project area. Since there is no activity in riparian areas that could be possible habitat for the golden eagle and there are no overlapping projects with the Rim-Paunina analysis area, there would also be no cumulative effects.

**Conclusion**
Rim-Paunina project actions would not decrease golden eagle habitat. Project actions reducing overall tree density and understory would improve forests for possible golden eagle habitat. Project mitigation measures protect and maintain raptor nesting habitat in the following ways: (1) seasonal restriction within a ¼ mile of a known nest site, (2) at least 15 percent retention of untreated habitat within treated acres as well as untreated suitable nesting habitat within the project area, and (3) treating stands to be resilient to disturbance, such as wildfires, insect, and disease.

The golden eagle is listed as S4, ‘Apparently Secure’ in the state of Oregon (NatureServe 2011). The Rim-Paunina project implementation may improve potential nesting habitat by opening canopy cover and understory, as long as re-entry occurs.

This analysis incorporates all past management activities forest wide. No other districts have overlapping project boundaries with the Rim-Paunina project, and since there are no overlapping projects on the Crescent Ranger District there are no cumulative effects. Project implementation, along with continued re-entry, would increase potential nesting habitat for the golden eagle around the Walker Rim area. Recent Deschutes National Forest analysis shows there are 49,233 acres of modeled nesting habitat for the golden eagle. There is ample nesting habitat outside the project area forest wide. For the Deschutes National Forest, the Rim-Paunina project would not contribute to any change in the viability of the golden eagle.

## Birds of Conservation Concern

In January 2001, President Clinton issued an executive order on migratory birds directing federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. A Memorandum of Understanding (MOU) exists with the U.S. Fish and Wildlife Service to conserve migratory birds, and includes taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporate migratory bird conservation into agency planning processes whenever possible. Prior to the Memorandum of Understanding being finalized, several documents were produced for the conservation of migratory birds. These documents from the U.S. Fish and Wildlife Service included the Birds of Conservation Concern released in 2002 and the U.S. Shorebird Conservation Plan released in 2004.

The "Birds of Conservation Concern 2002" (BCC) identifies species, subspecies, and populations of all migratory non-game birds that without additional conservation protection actions are likely to become candidates for listing under the Endangered Species Act of 1973. While all of the bird species included in the BCC are priorities for conservation action, the list makes no finding with regard to whether they warrant consideration for Endangered Species Act listing. The goal is to prevent or remove the need for additional Endangered Species Act bird listings by implementing proactive management and conservation plans. The U.S. Shorebird Conservation Plan (USFWS 2004, revised 2007) was released in 2004 and updated in 2007 with new information, and developed a list of U.S. and Canadian shorebirds considered highly imperiled or of high conservation concern. Conservation measures were not included but these lists should be consulted to determine reasons for conservation concern.

Bird Conservations Regions (BCRs) were developed based on similar geographic parameters. The Rim Paunina project area falls completely within one BCR; BCR 9, Great Basin. Table 58 displays the Bird Conservations Region species for this area, preferred habitat and whether suitable habitat is present in the project area.

**Table 58. Bird Conservation Region 9 (Great Basin) 2008 List**

| Bird Species | Preferred Habitat | Habitat in Rim-Paunina Project Area |
|---|---|---|
| Greater Sage Grouse (Columbia Basin DPS) (a) | Sagebrush dominated rangelands | No Habitat |
| Eared Grebe (nb) | Nests near shore on small freshwater lakes and reservoirs with emergent vegetation | No Habitat |
| Bald Eagle | Nests in large conifers usually near lakes, reservoirs | No Habitat |
| Ferruginous Hawk | Sagebrush-shrub steppe | No Habitat |
| Golden Eagle | Elevated nest sites in open country | No Habitat |
| Peregrine Falcon (b) | Cliffs | No Habitat |
| Yellow Rail | Marshes with shallow water | No Habitat |
| Snowy Plover | Dry sandy beaches | No Habitat |
| Long-billed Curlew | Grasslands | No Habitat |
| Marbled Godwit (nb) | Marsh/Wet Meadows | No Habitat |
| Yellow-billed Cuckoo (w. U.S. DPS) (a) | Dense riparian/cottonwoods | No Habitat |
| Flammulated Owl | Ponderosa pine forests | Potential Habitat |
| Black Swift | Cliffs associated with waterfalls | No Habitat |

| Bird Species | Preferred Habitat | Habitat in Rim-Paunina Project Area |
|---|---|---|
| Calliope Hummingbird | Open mountain meadows, open forests, meadow edges, and riparian areas breeding mainly at middle elevations | No Habitat |
| Lewis' Woodpecker | Ponderosa pine forests | Species Documented |
| Williamson's Sapsucker | Ponderosa pine forests | Species Documented |
| White-headed Woodpecker | Ponderosa pine forests | Species Documented |
| Willow Flycatcher | Breeding habitat is dense shrubs and/or tall herbaceous vegetation especially riparian willow thickets | No Habitat |
| Loggerhead Shrike | Open country with scattered trees/shrubs | No Habitat |
| Pinyon Jay | Juniper, juniper-ponderosa pine transition, and ponderosa pine edge forests | No Habitat |
| Sage Thrasher | Preferred breeding habitat is big sagebrush but would also use greasewood, shadscale and rabbit brush. | No Habitat |
| Virginia's Warbler | Mountain Mahogany groves | No Habitat |
| Green-tailed Towhee | Vigorous shrub stands with high shrub species diversity and less abundant in big sagebrush habitat | Species Documented |
| Brewer's Sparrow | Sagebrush clearings in coniferous forests/bitterbrush | Potential Habitat |
| Black-chinned Sparrow | Dry slopes and hillsides covered with tall thick vegetation, SE and SW Oregon | No Habitat |
| Sage Sparrow | Sagebrush | No Habitat |
| Tricolored Blackbird | Cattails or tules | No Habitat |
| Black Rosy-Finch | Bare rock outcrops, cliffs and talus for breeding on Steens Mountains. | No Habitat |
| (a) ESA candidate, (b) ESA delisted, (c) non-listed subspecies or population of Threatened or Endangered species, (d) MBTA protection uncertain or lacking, (nb) non-breeding in this BCR | | |

The following species have not been documented to occur as there is no suitable habitat present in the Rim-Paunina project area: greater sage grouse, eared grebe, ferruginous hawk, golden eagle, peregrine falcon, yellow rail, snowy plover, long-billed curlew, marbled godwit, yellow-billed cuckoo, black swift, calliope hummingbird, willow flycatcher, loggerhead shrike, pinyon jay, sage thrasher, Virginia's warbler, black-chinned sparrow, sage sparrow, tricolored blackbird, and black rosy finch. The bald eagle, Lewis' woodpecker and white-headed woodpecker are discussed in the Threatened and Endangered section. The Williamson's sapsucker is discussed in the Management Indicator Species (MIS) portion of this document.

Habitat for the green-tailed towhee and Brewer's sparrow potentially occur in the Rim-Paunina project area and are discussed below. The flammulated owl is on both the Birds of Conservation Concern and the Landbird Focus Species list, and is discussed in the latter section.

**Mitigations and Project Design Features**
Mitigation Measures and Project Design Features are automatic modifications that would be made to vegetation prescriptions to protect known or newly discovered Management Indicator Species (MIS) and Threatened, Endangered and Sensitive (TES) species during treatment. These are discussed in detail in the Management Indicator Species section and Chapter 2 of this document. These features would also increase protection of the Birds of Conservation Concern and Landbird Focal Species.

**Green-tailed Towhee *(Pipilo chlorurus)* and Brewer's Sparrow *(Spizella breweri)***
***Ecology and Existing Condition***
The green-tailed towhee and Brewer's sparrow are discussed together because of similar life histories and breeding territories. Both are long distance migrants, flying from southern California and as far as southern Mexico. The breeding range of both species includes eastern, central and southern Oregon, down into southern California and east to include Nevada, Arizona and Idaho. The primary nesting habitat is sagebrush, but other shrubs and thickets are used, depending on elevation (Nature Serve, 2011). Both forage primarily on the ground (Dawson et al. 1979, NatureServe 2011). Threats to both species include ground squirrels, chipmunks, red squirrels, snakes, and weasels that prey on nestlings. Adults are preyed upon by raptors and shrikes (NatureServe 2011).

The green-tailed towhee is known to use riparian areas in dry open country for nesting (Gilligan et al. 1994) but it utilizes primarily low shrubs, sometimes interspersed with trees; it avoids typical forest, other than open pinyon-juniper woodlands (Dobbs et al. 1998). Nests in Oregon are not well described but generally located in low bushes close to the ground, woven of grasses and lined with hair sometimes of porcupine (Gabrielson and Jewett 1940 cited by Marshall et al. 2003). Jehle et al. (2006) found that green-tailed towhee nesting success decreased in areas of contiguous high shrub density. It was postulated that the historic frequent fire regime scattered the dense brush clumps used for nesting across the landscape, which diminished the competition between nesting towhees for limited food resources and the potential for predation.

Brewer's sparrow is also known to utilize a variety of other shrub species in the Great Basin and has been found as high as 6,000 feet elevation in the Cascades (Gilligan et al. 1994; M. Patterson pers.comm. in Marshall 2003). The sparrow also prefers areas dominated by shrubs rather than grass and sites with high shrub cover and large patch size, but thresholds for these values have not been quantified (Knick and Rotenberry 1995). It prefers to build its nests low in sagebrush or other shrubs, from an inch to about three feet from the ground.

The current NatureServe Conservation Status Rank for both the green-tailed towhee and the Brewer's sparrow in Oregon is a S4B, 'Breeding Population Apparently Secure', and nationally G5, 'Secure' (2009). Both species show short-term declines in their population, which is considered linked to habitat fragmentation and degradation, primarily associated with the conversion of big-leaf sagebrush to tilled agriculture, the replacement of sagebrush with annual grassland to promote livestock forage and invasive, non-native plants in the Great Basin (NatureServe 2011). There is one documented observation of a green-tailed towhee and no documentation of Brewer's sparrow within the analysis area.

## *Environmental Consequences*
**Direct and Indirect Effects Common to All Alternatives**
The primary nesting habitat for the green-tailed towhee and Brewer's sparrow is in drier ecosystems with a strong sagebrush component. While some fringe habitat may be available in the Rim-Paunina project area, it is unlikely that any significant nesting habitat is present for either species. Therefore, no direct or indirect effects would occur to these populations in any of the alternatives.

## Landbird Strategic Plan

The Forest Service has prepared a Landbird Strategic Plan (January 2000) to maintain, restore, and protect habitats necessary to sustain healthy migratory and resident bird populations to achieve biological objectives. The primary purpose of the strategic plan is to provide guidance for the Landbird Conservation Program and to focus efforts in a common direction. On a more local level, individuals from multiple agencies and organizations within the Oregon-Washington Chapter of Partners in Flight participated in developing a publication for conserving landbirds in this region. *A Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington* was published in June 2000 (Altman). This strategy has been used since its development in planning and projects analysis.

The Rim-Paunina project area falls within the Central Oregon subprovince. The species selected in the conservation strategy represent focal species for habitats types or features considered at risk. Table 59 shows the focal species for the habitats that occur within the project area.

**Table 59. Landbird Focal Species for Central Oregon**

| Habitat | Habitat Feature | Focal Species for Central Oregon | Rim Paunina Project Area Habitat Present |
|---|---|---|---|
| Ponderosa Pine | Large patches of old forest with large trees | White-headed woodpecker | Yes |
| | Large trees | Pygmy nuthatch | Yes |
| | Open understory with regenerating pines | Chipping sparrow | Yes |
| | Patches of burned old forest | Lewis' woodpecker | Yes |
| Mixed Conifer Late-Successional | Large trees | Brown creeper | Yes |
| | Large snags | Williamson sapsucker | Yes |
| | Interspersion grassy openings/dense thickets | Flammulated owl | Yes |
| | Multi-layered/dense canopy | Hermit thrush | Yes |
| | Edges and openings created by wildfire | Olive-sided flycatcher | Yes |
| Lodgepole pine | Old growth | Black-backed woodpecker | Yes |
| Meadows | Wet/dry | Sandhill Crane | No |
| Aspen | Large trees with regeneration | Red-naped sapsucker | Yes |
| Subalpine fir | Patchy presence | Blue grouse | Minimal |
| Whitebark pine | Old growth | Clark's nutcracker | Yes |

Existing habitat conditions and potential impacts to the Lewis' and white-headed woodpeckers are discussed in the Threatened, Endangered, and Sensitive species section. Habitat conditions and impacts to the Williamson sapsucker, black-backed woodpecker and red-naped sapsucker are disclosed in the Management Indicator Species section. There is no suitable sandhill crane habitat in the project area.

The remaining species from Table 59 with potential for occurrence in the Rim-Paunina project area and discussed below include: flammulated owl, pygmy nuthatch, chipping sparrow, brown creeper, hermit thrush, olive-sided flycatcher, blue grouse, and the Clark's nutcracker.

**Flammulated Owl *(Otus flammeolus)* and Pygmy Nuthatch *(Sitta pygmaea)***

***Ecology***

The flammulated owl and pygmy nuthatch are discussed together, as they utilize similar habitats: late-successional, open-canopied ponderosa pine forests. Both species are dependent on snags or live trees with dead tops. They share habitat preferences with some of the MIS species (great grey owl, various

woodpeckers). While the pygmy nuthatch usually excavates its own nesting cavity, the flammulated owl is a secondary cavity nester and is dependent on cavity nesters like the pileated woodpecker and the northern flicker for its nesting site (Nelson et al. 2009).

The flammulated owl is one of the smallest owls in North America and is unique in that it preys almost exclusively on insects. It is a neotropical migrant (USDA 1994b). The species winters in central and southern Mexico, Guatemala, and El Salvador. In Oregon, this species breeds on the eastern slope of the Cascades, Blue and Wallowa Mountains and in small numbers in the mountains of southwest Oregon (Marshall et al. 2003). Their breeding season reaches its peak between June and July (NatureServe 2011). Flammulated owls are most closely associated with ponderosa pine forest but also nest in mixed coniferous stands dominated by ponderosa pine. Marshall et al. (2003) reported that forested stands used for nesting tend to have moderate to high levels of upper canopy closure ranging from 31-94 percent with a rather open understory or an open area adjacent, which can be used for foraging. The species is a cavity nester and in northeastern Oregon ponderosa pine snags are the most commonly used nest tree (Marshall et al. 2003). Nelson et al. (2009) suggested that the limiting factor for suitable habitat for flammulated owls is not the amount of food available as much as the presence of suitable nesting cavities. Snags and trees used for nesting averaged 22 and 28 inches diameter breast height in two Oregon studies (Goggans 1986; Bull et al. 1990 cited by Marshall et al. 2003).

Little is known on the population status of the flammulated owl to indicate significant population declines (Marshall et al. 2003). Risks to these species include loss of mature ponderosa pine forests, fire suppression resulting in overstocked stands and reduced snag recruitment and salvage logging (Marshall et al. 2003). The Oregon State Heritage Program lists a ranking of S3, 'Vulnerable Breeding Population' for the flammulated owl (NatureServe 2011) due to loss of snags for firewood or during timber harvest operations. The life history of flammulated owls tend to slow their recovery from population declines, as established pairs rarely expand their territories and seldom increase their reproduction rates, even when neighboring habitats and abundant food supplies are available (NatureServe 2011).

The pygmy nuthatch is a resident of ponderosa pine dominated forests from the east slopes of the Cascades eastward into the Blue and Warner Mountains (Marshall et al. 2003). It forages in young ponderosa pines and in lodgepole pines adjacent or near mature ponderosa stands. The pygmy nuthatch is a primary cavity nester, excavating nests in snags or dead portions of live trees. Outside of their breeding season, pygmy nuthatches roost in communal cavities, which are larger than their individual nest cavities. In winter, larger flocks of pygmy nuthatches use the same cavity roost; up to 150 birds using the same cavity to conserve body heat (Ghalambor and Dobbs 2006). Their diet includes beetles, ants, true bugs, butterfly/moth larvae, spiders, and pine seeds. Foraging pygmy nuthatches utilize the whole tree for foraging, from lower bole to the branches, cones, needles and emerging shoots. It rarely utilizes downed wood. Typical nest cavities in California were found in decaying pines that usually exceeded 20 inches in diameter. In Arizona, nest cavities were found in trees averaging 16 inches in diameter at breast height (dbh; Marshall et al. 2003). Risks to the pygmy nuthatch include loss of snags and predation from chipmunks and red squirrels, which abound in areas with a dense shrub undercanopy (Ghalambor and Dobbs 2006). The Oregon State Heritage Program lists the pygmy nuthatch ranking as S4, 'Apparently Secure.'

***Existing Condition***

Viable Ecosystem modeling was done for both species to approximate the amount of potential nesting habitat and accounts for all past and present timber sales and wildfires. Modeling indicates there is approximately 4,780 acres (12 percent of the project area) of potential flammulated owl nesting habitat. The habitat definition used was forests of ponderosa pine, dry to moist Douglas-fir, white fir, and moist Shasta fir with the presence of ponderosa pine, dense or open stands, and with trees greater than 15 inches in diameter (dbh). The flammulated owls' consolidated nesting habitat is located along Walker Rim but

includes other stands west of Highway 97. There are no District records or reports of flammulated owls in the project area.

The Viable Ecosystem modeling program for the pygmy nuthatch indicates there are approximately 5,022 acres (13 percent of the project area) of nesting habitat. The nesting habitat definition used was dense or open forests of ponderosa pine, dry to moist Douglas-fir, and white fir with the presence of ponderosa pine, with dense or open canopies and trees greater than 15 inches in diameter at breast height (dbh). The most consolidated acreage is located along Walker Rim but also includes ponderosa pine dominated stands both east and west of Highway 97. There are undocumented reports from wildlife field crews of pygmy nuthatches in the project area.

## *Environmental Consequences*

**Alternative A- No Action**
**Direct and Indirect Effects**
This alternative would have no immediate effect on either species. For the Rim-Paunina project area, it is assumed that in the short-term, endemic levels of insects, disease, and density related mortality to existing stands would continue to provide snag habitat for both species. Over time, increased canopy layering and tree density would subject these stands to increased levels of risk of loss due to fire, insect, and disease. This could result in a temporary increase in high density snag conditions favorable to these listed species.

This alternative has the greatest level of risk from a wide-scale disturbance event (i.e. from insect, diseases, or fire) and the tradeoff would be short versus long-term habitat. A large magnitude event (fire, insect infestation, etc.) would alter habitat for many decades and would not contribute to suitable nesting or foraging habitat conditions over the longer-term.

**Direct and Indirect Effects Common to All Action Alternatives**
All proposed management activities would move the current vegetative condition towards its historical range of variability: a predominantly fire dependent, open ponderosa pine forest consisting of large-diameter trees with standing snags, downed wood, and components of mixed conifer and lodgepole pine habitat, with a mosaic of understory regeneration and openings. The primary difference is the number of acres treated (Alt. B: 12,000 acres, Alts. C and D 15,000 acres, and Alt. E: 16,000 acres, approximately). The retention and creation of snags, decreased understory, removal of diseased trees, and heavy fuel loads in the project area would increase and stabilize suitable nesting habitat for both pygmy nuthatches and flammulated owls (Ghalambor and Dobbs 2006; Marshall 2003; Nelson et al. 2009).

Viable Ecosystem habitat modeling for all alternatives show an increase in nesting habitat for both the flammulated owl and pygmy nuthatch from the current levels to the projected for the years 2018 and 2058 (Table 60 and Table 61). Alternatives D and E would have projected habitat levels similar to those in Alternative A in the projected future, although the probability of high levels of disease, insect infestation, and intense wildfire is much lower due to the proposed treatments.

Table 60 shows the projected flammulated owl nesting habitat in the planning area post harvest and projected out for each alternative to the year 2058 in acres and in percent of project area (i.e. 4,780 acres currently suitable or 12 percent of the planning area).

**Table 60. Flammulated Owl Nesting Habitat in the Planning Area**

| Year 2010 | Year 2018 | | | | | Year 2058 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
| 4,780 (12%) | 6,410 (16%) | 7,303 (18%) | 7,239 (18%) | 6,991 (17%) | 7,071 (18%) | 13,546 (34%) | 14,319 (36%) | 14,381 (36%) | 13,835 (35%) | 13,423 (34%) |

Table 61 shows the projected pygmy nuthatch nesting habitat in the planning area post harvest and projected out for each alternative to the year 2058 in acres and in percent of project area (i.e. 5,022 acres currently suitable or 13 percent of the planning area).

**Table 61. Pygmy Nuthatch Nesting Habitat in the Planning Area**

| Year 2010 | Year 2018 | | | | | Year 2058 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
| 5,022 (13%) | 6,669 (17%) | 7,556 (19%) | 7,494 (19%) | 7,245 (18%) | 7,319 (18%) | 14,265 (36%) | 15,010 (38%) | 15,075 (38%) | 14,525 (36%) | 14,100 (35%) |

All alternatives show increase nesting habitat in 2018 and 2058. More nesting habitat is modeled in 2058 because there is no vegetative activity to maintain the historic range of variability thus increasing stand density. Alternatives B and C modeled nesting habitat shows the most potential habitat in year 2018 and 2058. However, the difference between each action alternative is minimal after project implementation and in projected year 2058.

Ponderosa pine and Douglas-fir trees would be favored tree species for retention as they are more fire tolerant and have the potential to achieve the largest diameters. This would benefit the species within several decades as canopy cover returns, returning stands to nesting and foraging habitat. This also contributes to nesting habitat for the pileated woodpecker and northern flicker, upon which the flammulated owl depends for nesting cavities. See the white-headed woodpecker and Lewis' woodpecker in the Woodpecker Guild portion of the MIS section for snag and downed wood densities.

**Cumulative Effects**

Table 19 has been review for relevancy and no other actions, currently or in the foreseeable future, are planned in the Rim-Paunina project area that would impact the Flammulated Owl or Pygmy Nuthatch.

**Chipping Sparrow (*Spizella passerine*)**

**Ecology and Existing Condition**

The chipping sparrow is found throughout the continental United States, north into Canada and as far south as southern Mexico. Breeding populations in Canada and the northern United States are long-distant migrants from the lower United States and Mexico. Their nesting habitat is inclusive, ranging from croplands, hardwood and coniferous forest, to forest edges, grasslands, and savannahs. They seem to benefit from human-caused habitat alterations (NatureServe 2011). In central Oregon, chipping sparrows can be found in open coniferous forests or stands of trees interspersed with grassy openings or low foliage as well as in juniper, ponderosa pine, and lodgepole pine forests (Marshall et al. 2003). Nests are usually in trees or shrubs, three feet to over thirty-six feet above the ground. Adults and juveniles feed on seeds and insects, foraging mainly on the ground (NatureServe 2011).

The current NatureServe Conservation Status Rank for chipping sparrows in Oregon is a S4, 'Apparently Secure', and nationally as G5, 'Secure' (2011). Annual population declines of chipping sparrows have averaged 3.9 percent in Oregon due to a decrease in wildfires to maintain open woodlands but also due to

cowbird brood parasitism and competition with house sparrows and house finches (Marshall et al. 2003). Sharp-shinned and Cooper's hawks are known to predate on adults (NatureServe 2011). There is no documentation of chipping sparrows on the district, although chipping sparrows have been observed by the district wildlife crew members during goshawk surveys (K. Boucher pers. comm. 2009).

### *Environmental Consequences*

The Viable Ecosystem model was used to estimate acres of suitable habitat for the chipping sparrow. This figure accounts for all past and present timber sales and natural events such as wildfires. The definition used was open canopied stands of lodgepole pine, ponderosa pine, white fir, and mountain hemlock with tree diameters 10-15 inches or larger. This definition resulted in an estimated 3,206 acres of potentially suitable nesting habitat scattered throughout the 40,000 acre project area.

Table 62 shows projected chipping sparrow nesting habitat in the planning area post harvest and projected out for each alternative to the year 2058 in acres and percent of project area (i.e. 3,206 acres currently suitable or 8 percent of the planning area).

**Table 62. Chipping Sparrow Nesting Habitat in the Planning Area**

| Year 2010 | Year 2018 | | | | | Year 2058 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alt. A | Alt .B | Alt. C | Alt. D | Alt. E | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
| 3,206 (8%) | 3,647 (9%) | 5,451 (14%) | 5,328 (13%) | 5,067 (13%) | 5,134 (13%) | 4,957 (13%) | 6,366 (16%) | 6,329 (16%) | 6,236 (16%) | 6,205 (16%) |

**Alternative A- No Action**

**Direct and Indirect Effects**

This alternative would have no immediate effect on the chipping sparrow. For the Rim-Paunina project area, it is assumed that in the short-term, endemic levels of insects, disease, and density related mortality to existing stands would continue to provide open forest, forest edge, and shrub habitat. Over time increased canopy layering and tree density would subject these stands to increased levels of risk of loss due to fire, insect, and disease. This would result in more open areas and meadows which would provide habitat for the chipping sparrow, but would remove any habitat in the long term for the MIS and TES species that are endemic to this area.

**Direct and Indirect Effects for All Alternatives**

All alternatives show some increases in nesting habitat in 2018 and 2058. Nesting habitat is modeled to increase slightly in 2058 because the openings created in the project would regenerate into open forests while the existing open canopies would grow closed over time. Alternative B modeled nesting habitat shows the most potential habitat in year 2018, while all action alternatives show similar increases in 2058. However, while the difference between each action alternative is minimal after project implementation and in projected year 2058, Alternatives D and E would create the most open, contiguous nesting habitat for the chipping sparrow through the mistletoe treatment areas.

**Cumulative Effects**

Table 19 has been review for relevancy and no other actions, currently or in the foreseeable future, are planned in the Rim-Paunina project area that would impact the Chipping Sparrow.

**Brown Creeper *(Certhia americana)***

**Ecology and Existing Condition**

The brown creeper is a common but inconspicuous permanent resident in most of Oregon (Gilligan et al. 1994). Its breeding range extends from Alaska across to Newfoundland, south through Mexico to Middle America (NatureServe 2011). The brown creeper is the only North American bird that relies on both the

trunk and bark of trees for nesting and foraging. It is found predominantly in the coniferous forests but can also be located in oak woodlands, cottonwood stands, and in urban areas during the winter (Marshall et al. 2003). Brown creeper populations have been known to temporarily increase in areas that have had major tree die-offs, such as fire and disease-killed stands, taking advantage of the increased snag availability (NatureServe 2011). Altman (2000) stated the brown creeper shows a preference for Douglas-firs as the deeply fissured bark offers better foraging opportunities. Old cottonwoods and oaks have been utilized for similar reasons. It nests under loose sloughing bark of large diameter snags with little to moderate decay. Nesting in Oregon can occur from near sea level to high in the mountains (Gilligan et al. 1994). Marshall et al. (2003) reported the diameters of nest trees in the Coast Range varied from 16 inches to 42 inches diameter breast height (dbh) with the mean diameter increasing as stands mature. Threats to this species include the loss of large diameter snags and live trees. Sauer et al. (1999 cited by Altman 2000) stated there was an increase in the brown creeper population of 3.1 percent as seen in the Cascade Mountains Breeding Bird Survey between 1980 and 1998, but this was an insignificant increase in a short-term trend.

The brown creeper shares its nesting habitat preferences with both the white-headed woodpecker and the northern goshawk. While the white-headed woodpecker prefers an open canopy and the goshawk prefers a closed canopy, the brown creeper utilizes both. The creeper would also be able to use the goshawk's open-canopied, mature pine foraging areas for nesting habitat as well. Documented nest predation by rodents on white-headed woodpecker suggests that other cavity nesters are similarly impacted when brush densities are high, but there are no known studies or observations to verify this. There is no documentation of brown creepers in the Rim-Paunina project area, although sightings have been reported by Crescent District wildlife crew members in the older mixed conifer forests of the project area.

For more in-depth discussion on nesting habitat condition and snag density tolerance intervals in the Rim-Paunina project area, see the discussions for the northern goshawk (MIS Section) and White-headed woodpecker (TES section) in this chapter.

### *Environmental Consequences*

The Viable Ecosystem model was used to determine an approximate number of nesting habitat acres in the Rim-Paunina analysis area. The definition used was all Plant Association Groups (PAGs) with tree diameters exceeding 15 inches with an open or closed canopy condition. This resulted in approximately 6,176 acres of nesting habitat on National Forest land within the 40,000 acre Rim-Paunina project area.

Table 63 displays projected nesting habitat for brown creeper in the planning area post harvest and projected out for each alternative to the year 2058 in acres and percent of project area (i.e. 6,176 acres currently suitable or 15 percent of the planning area).

**Table 63. Brown Creeper Nesting Habitat in the Planning Area**

| Year 2010 | Year 2018 | | | | | Year 2058 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alt. A | Alt .B | Alt. C | Alt. D | Alt. E | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
| 6,176 (15%) | 8,630 (22%) | 9,176 (23%) | 9,175 (23%) | 8,928 (22%) | 8,840 (22%) | 17,880 (45%) | 18,040 (45%) | 18,196 (45%) | 17,645 (44%) | 17,080 (43%) |

**Alternative A**

**Direct and Indirect Effects**

The selection of this alternative would have little short term (year 2018) impact on the brown creeper or its nesting habitat, although the possibility of nest predation by rodents in dense-brush areas would remain. All Plant Association Groups (PAGs) with trees greater than 15 inches diameter trees and snags would continue to provide habitat for this species within the project area. The long-term (year 2058)

consequences of no treatment would be the overcrowding and competition in the pine and mixed-conifer stands which would lead to an increased mortality level in large diameter trees. The current overcrowding conditions in these stands also elevate mistletoe infection and beetle infestations resulting in reduced tree vigor leading to premature tree mortality. This could result in a temporary increase in high density snag conditions favorable to the brown creeper. In addition to increasing the potential of nest predation by rodents that inhabit dense brush, the high tree density creates spatial continuity within the Plant Association Group (PAG) types increasing the risk of forest replacement fires. Many forested stands are still at risk of catastrophic wildfire events similar to the Davis Fire, which resulted in the long-term loss of over 16,000 acres of suitable habitat.

**Effects Common to All Action Alternatives**

All action alternative acreage amounts increase over time as a result of expected increase in tree vigor from thinning, reducing overcrowded stands, reduced fuel loading, and the probability of advancing stands to the next successional stage. In all action alternatives, thinning within younger-aged stands would reduce competition for scarce resources and thus allow the residual trees to increase their size potential. In addition, management practices would encourage development of a more resilient forest (e.g. reducing the risk of disease, infestation, and fire events in nesting habitat). All treated ponderosa pine stands should return to the historic range of variability.

All action alternatives increase nesting habitat after project implementation in years 2018 and 2058. Alternatives B and C modeled nesting habitat shows the most potential habitat in years 2018 and 2058. However, the difference between each action alternative is minimal after project implementation and in projected year 2058. More nesting habitat is modeled in 2058 because there is no vegetative activity to maintain the historic range of variability thus increasing stand density. Alternative E treats the most potential nesting habitat and therefore, provides the least amount of acres after implementation. In year 2058 all action alternatives increase the amount of projected healthy suitable habitat above existing condition of 6,176 acres to as much as 18,196 in Alternative C. Alternatives D and E are projected to provide the least amounts of nesting habitat (17,645 acres and 17,080 acres respectively) out of the action alternatives due to the proposed management activities.

It is possible that any operations (thinning or underburning) conducted during the nesting season may affect breeding pairs of brown creepers. This may result in pairs being displaced into adjacent habitats. Not all sales would be active at the same time, leaving undisturbed nesting habitat widely distributed across the planning area within a five year time period. In addition, for each action alternative there is personal and/or commercial firewood removal proposed in a limited number of harvest units.

**Cumulative Effects**

Table 19 has been review for relevancy and no other actions present or in the foreseeable future are planned in the Rim Paunina project are that would impact the Brown Creeper.

**Hermit Thrush (*Catharus guttatus*)**

**Ecology and Existing Condition**

The hermit thrush is an opportunistic ground forager in all types of mature forests containing multiple canopy layers of brush and small trees, feeding on insects, berries, and small vertebrates (Marshall et al. 2003). Gilligan et al. (1994) described the hermit thrush as a fairly common summer resident in the Cascade, Siskiyou, and Blue Mountains and uncommon in the Coast Range of Oregon. They are known to breed in mature forests of all types that provide a shaded understory of brush and small trees (Aldrich 1968 in Marshall 2003). Breeding sites usually have semi-open canopies and many areas lack a dense understory having only a minimal shrub cover (D. Fix pers.comm. Marshall 2003). Nests are on the ground, in dense brush or in small trees (Mannan 1980). The few Oregon nests that have been described were in spruce and fir saplings six to eight feet above the ground (Gabrielson and Jewett 1940 in Marshall

2003). During the winter months they are rarely seen east of the Cascades as they tend to winter in the west-side lowlands and foothills along the coast. There appear to be no serious conservation problems at this time (Marshall et al. 2003). The current NatureServe Conservation Status Rank for hermit thrushes in Oregon is a S4, 'Apparently Secure', and Nationally G5, 'Secure' (2009).

Smucker et al. (2005) reported that hermit thrush populations increase in abundance in forests that burned at low severity, primarily due to the increase in low shrub and grass cover the first few years post fire, which increases their food resources. High severity fires, usually seen with high fuel loads from past fire suppression activities, decrease the relative abundance of hermit thrush nesting and hiding habitat as the understory of young trees and tall shrubs is destroyed.

The Viable Ecosystem model was used to approximate acres of suitable nesting habitat in the project area. Using a definition of all Plant Association Groups (PAGs) with tree diameters exceeding 10-15 inches with a dense canopy resulted in an estimated 1,055 acres of nesting habitat. All of the suitable acres are on National Forest lands within the mixed conifer and ponderosa pine plant association groups. These are predominantly on Walker Mountain outside most of the treatment area. The percentage of acres that are within the proposed activity areas are units that are designated for fuels treatment (brush removal and small diameter thinning). There are no formal surveys or district observational records of hermit thrush occurring in the planning area; however they are assumed to be present in low numbers, making detection difficult.

### *Environmental Consequences*

The Viable Ecosystem model projected an increasing trend of suitable nesting acreage for the hermit thrush over each decade that was modeled (Table 64). In year 2018 Alternative A shows a greater increase in nesting habitat over time than the four action alternatives; however, the action alternatives after treatment provide healthier stands that have a vegetation structure more capable of responding to natural levels of frequent fire disturbance. This is due to trees becoming larger with fuller canopies as competition is reduced and the understories become more open. After five decades, the Viable model shows 2,662 acres of hermit thrush habitat in Alternative A, 2,481 acres in Alternative B, 2,507 acres in Alternative C, 2,501 acres in Alternative D, and 2,473 in Alternative E. For comparison, current nesting habitat in the Rim-Paunina project area is 1,055 acres.

All action alternatives use management techniques that impact forest vegetation (thinning, underburning, brush mastication, etc.) that would lead to a sustainable ecosystem type that functions in the natural fire regime of this area. As the vegetation responds to the proposed treatments, hermit thrush habitat is expected to improve over time as the treated areas mature throughout the project area.

Table 64 shows projected hermit thrush nesting habitat in the planning area post harvest and projected out for each alternative to the year 2058 in acres and percent of project area (i.e. 1,055 acres currently suitable or 3 percent of the planning area).

**Table 64. Hermit Thrush Nesting Habitat in the Planning Area**

| Year 2010 | Year 2018 | | | | | Year 2058 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
| 1,055 (3%) | 1,233 (3%) | 1,148 (3%) | 1,158 (3%) | 1,156 (3%) | 1,134 (3%) | 2,662 (7%) | 2,481 (6%) | 2,507 (6%) | 2,501 (6%) | 2,473 (6%) |

**Alternative A**
**Direct and Indirect Effects**
The selection of this alternative would likely have no effect on the hermit thrush and it's habitat in the short-term. Nesting habitat would be maintained and well distributed in the multi-layered, dense canopy stands of ponderosa pine and mixed conifer forests found in the Rim-Paunina project area. Following the Viable Ecosystem model, the short term (2018) nesting habitat would have increased by less than 200 acres over the current habitat, and would be slightly more than any of the action alternatives by less than 100 acres. However, this alternative has the highest risk from loss associated with competition for scarce site resources and future disturbance from fire events that potentially lead to large scale loss of the younger trees and shrubs upon which the hermit thrush is dependent.

**Effects Common to All Action Alternatives**
All four action alternatives propose silvicultural and/or fuels treatments to improve overall stand health and maintain the presence of the dominant large overstory trees, primarily ponderosa pine, and a more open understory. The resulting amount of suitable nesting habitat would vary by alternative, but the difference between acreage would be insignificant: less than 100 acres difference in 2018, and less than 200 acres in 2058. The No Action Alternative (A) would have slightly more nesting habitat than the action alternatives, but the vegetation would be more susceptible to intense wildfires, disease and insect infestation.

**Cumulative Effects**
Table 19 has been reviewed for relevancy and no other activities present or in the foreseeable future are planned for the Rim-Paunina project area that would affect the Hermit Thrush.

**Olive-sided Flycatcher *(Contopus cooperi)***
**Ecology and Existing Condition**
The olive-sided flycatcher is a neotropical migrant that inhabits montane and northern coniferous forests up to 3,000 meters (9,482 feet) in elevation, especially in burned-over forest areas with tall standing dead trees (DeGraaf and Rappole 1995). In Oregon this flycatcher is a summer resident that breeds in low densities throughout coniferous forests. The olive-sided flycatcher prefers nesting near forest openings or edge habitats where forest meets meadows, timber harvest units, rivers, bogs, or marshes (Marshall et al. 2003). An aerial insectivore, the olive-sided flycatcher feeds almost entirely on flying insects, including bees and wasps (NatureServe 2011) found in these open areas. This species has not been documented to occur in the analysis area, but is assumed to be present. The current NatureServe Conservation Status Rank for the olive-sided flycatcher in Oregon is a S3B, 'Breeding Vulnerable', and Nationally 4B, 'Breeding Apparently Secure' (2009). NatureServe (2010) stated that fire suppression throughout the breeding range has limited the available habitat, although the deforestation of its wintering habitat in Central and South America seems to have a greater impact. It also reports the species is 'Apparently Secure' globally, although at risk from deforestation on wintering grounds in Central and South America.

This flycatcher is considered a contrast species using old forests for nesting and either openings or gaps in old forests for foraging. Large trees and snags are preferred habitat elements for the olive-sided flycatcher (Romain-Bondi 2009) which are used for singing and feeding perches (NatureServe 2011). They are positively associated with recent burns (Hejl 1994 cited by Wisdom et al. 2000). Nests are most often found on the horizontal limbs of live conifers, six to fifty feet above the ground. Wisdom (2000) cited that burning and uneven-aged management would help accelerate the development of old-forest conditions and the juxtaposition of early-seral and late-seral habitats used olive-sided flycatchers. Wisdom (2000) stated that suppression of wildfire has resulted in fewer, larger and more destructive fires, thereby reducing the areas of juxtaposed early- and late-seral forests. Altman (2000) recommended the use of underburning to promote a shrubby understory for insect production, retention of standing dead or

diseased trees where they occur, and that selective logging can be used to increase suitability of habitat as long as sufficient large living and dead trees are retained.

The Viable Ecosystem model was used to estimate acres of suitable nesting habitat for this species. The definition used was open canopied stands of lodgepole pine, ponderosa pine, mixed conifer, and mountain hemlock plant associations with tree diameters 5 -10 inches or larger in the lodgepole Plant Association Groups (PAGs) and greater than 10 inches in the remaining PAGs. This definition resulted in an estimated 9,909 acres (25 percent) of potentially suitable nesting habitat in the approximately 40,000 acre project area. This figure accounts for all past and present timber sales and natural events such as wildfires. Breeding bird surveys (Sauer et al. 1996 cited in Wisdom et al. 2000) indicated a 2.5 percent per year decline from 1966 to 1994 for olive-sided flycatchers in eastern Oregon and Washington but no known reason for the decline was given. Hann and others (1997 cited by Wisdom 2000) stated late-seral montane forest which provides source habitat for this species was tending to increase in more than 50 percent of the watersheds in the Southern Cascades which includes the Rim-Paunina project area.

### *Environmental Consequences*

The Viable Ecosystem modeling program projected an increasing trend of suitable nesting acreage over the first decade that was modeled (year 2018) for all alternatives with incremental differences between alternatives (Table 65). Projected nesting acreage after 50 years (year 2058) shows a decrease in nesting habitat, in the absence of fire or future vegetation management because as the forest grows and the open canopies close it reduces the habitat the olive-sided flycatcher utilizes.

Table 65 shows projected olive-sided flycatcher nesting habitat in the planning area post harvest and projected out for each alternative to the year 2058 by acres and in percent of project area (i.e. 9,909 acres currently suitable or 25 percent of the planning area).

**Table 65. Olive-sided Flycatcher Nesting Habitat in the Planning Area**

| Year 2010 | Year 2018 | | | | | Year 2058 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alt. A | Alt .B | Alt. C | Alt. D | Alt. E | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
| 9,909 (25%) | 10,569 (26%) | 12,076 (30%) | 11,958 (30%) | 11,695 (29%) | 11,472 (29%) | 5,353 (13%) | 7,652 (19%) | 7,361 (18%) | 7,272 (18%) | 7,280 (18%) |

**Alternative A**

**Direct and Indirect Effects**

This alternative would have no direct effects on the olive-sided flycatcher. Habitat conditions in the project area would change marginally in the least in the short-term, as forest die-off from competition and disease create openings in the forest canopy. In the long term, the current overcrowding conditions in these stands could result in an increasing risk of forest replacement fires, which would remove nesting habitat for the flycatcher entirely.

**Effects Common to All Action Alternatives**

**Direct and Indirect Effects**

All action alternatives propose a combination of commercial thinning, non-commercial thinning, and fuels reduction activities to maintain stand health and reduce the risk of large scale loss of large trees to wildfire, insects, and disease. The selection of any action alternative would result in improved habitat conditions for the olive-sided flycatcher in the short term by creating open-canopied forests and increasing forest openings or edge habitat that is preferred nesting habitat for the flycatcher. These activities would be consistent with strategies suggested by Wisdom (2000) and Altman (2000). These conditions would be promoted in each action alternative and would result in improved habitat conditions for olive-sided flycatchers. However, without continued treatment of stands, i.e. fuels treatment or

thinning, stand density would continue to increase moving forests above the historic range of variation, and the increased density levels would increase the risk of insect infestation, mistletoe infection, and intense fire events. This is represented by the long term nesting projection in the Viable Program model in the year 2058.

It is possible that any thinning or underburning conducted during the nesting season may affect breed pairs of olive-sided flycatchers. This may result in pairs being displaced into adjacent habitats. However, not all sales or activities would be active at the same time. Regardless of alternative chosen, undisturbed nesting habitat would be present and widely distributed across the project area.

Olive-sided flycatcher nesting habitat in all of the action alternatives are within 600 acres of each other, with Alternatives B and C having the greatest amount. Alternatives D and E treat the most acres, and so have the lowest number of potential nesting habitat acres. The long term projection of nesting habitat decreases to below current levels, due to canopy closure removing nesting habitat and foraging habitat.

**Cumulative Effects**
Table 19 has been reviewed for relevancy and no other actions present or in the foreseeable future, are planned in the Rim-Paunina project area that would impact the Olive-sided Flycatcher.

**Blue Grouse *(Dendragapus obscurus)***
**Ecology and Existing Condition**
The blue grouse is the largest of the three forest grouse found in Oregon and is fairly common in the coniferous forests from the Cascade crest to the coast, but also found in the Blue and Wallowa Mountains of eastern Oregon. They utilize a variety of habitats in the spring and summer months with insects, berries and seeds of various forbs and shrubs providing the bulk of their diet. Pelren (1996 cited in Marshall et al. 2003) stated open park-like stands of mature ponderosa pine and Douglas-fir were selected for wintering habitat where the grouse eat needles and buds. Pelren (1996) also stated that prescribed burning and other methods that maintain open park-like stands would likely benefit this species. Other winter range habitats include stands dominated by spruce, lodgepole pine, limber pine, western hemlock, and mountain hemlock (Zwickel 1992 cited in Marshall et al. 2003). Nesting habitat ranges from nearly bare ground with no overhead cover to dense vegetation beneath full forest canopies (Zwickel 1992; Pelren and Crawford 1999 cited in Marshall et al. 2003) with most successful nests beneath logs. NatureServe Conservation Status Rank (2010) lists the blue grouse as S4 'Apparently Secure' in the state of Oregon.

Blue grouse are not common on the Crescent District. While they have been observed in the areas adjacent to the Rim-Paunina project area that contain more water sources, the Viable Ecosystem model used to determine estimated acres of nesting and wintering habitat for this species estimated 11 acres of nesting habitat for blue grouse in the approximately 40,000 acre Rim-Paunina project area (<0.001 percent). For nesting and brood rearing habitat, the modeling definition used was all Plant Association Groups with open canopies and trees averaging less than five inches in diameter. The District Wildlife Observation database has only one record of blue grouse in the Rim-Paunina project area.

## *Environmental Consequences*

**Effects Common to All Alternatives**
Blue grouse habitat constitutes less than 0.001 percent of the Rim-Paunina project area. None of the proposed management activities within the Rim-Paunina project area would have any direct, indirect, or cumulative effects or consequences on the blue grouse population.

**Clark's Nutcracker *(Nucifraga columbiana)***

**Ecology and Existing Condition**

The Clark's nutcracker is a resident along the crest of the Cascade Mountains usually above 4,000 feet although lower on the east slopes. They breed in open coniferous forests of pine, spruce fir, and adjacent Douglas-fir and less often in juniper and ponderosa pine east of the Cascades. New nests are built every year in the outer branches on the leeward side of the tree (Marshall et al. 2003). In Oregon their diet includes ripe and unripe seeds of whitebark, limber, Jeffrey, and ponderosa pines, Douglas-fir, Shasta red fir, plus spiders, insects, and small mammals. Large wingless seeds of white pines are preferred (Lanner 1996; Tomback 1998 in Marshall et al. 2003). Clark's nutcrackers provide the sole mechanism of primary seed dispersal for whitebark pine (Hutchins and Lanner 1982 cited by Lorenz 2007) but they also collect and cache ponderosa pine seeds, and are actually better dispersers of ponderosa pine seeds than whitebark pine seeds (Raphael and Lorenz, 2011). As the Clark's Nutcracker is a habitat generalist, no Viable Ecosystem analysis was done for this species for this project.

Although there is only one documented sighting of a Clark's nutcracker on the Crescent Ranger District, they are commonly seen during late summer and early fall at the higher elevations of the Rim-Paunina planning area. The Oregon Heritage Information Center does not rank the Clark's nutcracker population, presumably due to the abundance and widespread distribution of this species. The current NatureServe Conservation Status Rank for the Clark's nutcracker in Oregon is an S4 'Apparently Secure.'

## *Environmental Consequences*

**Alternative A**

**Direct and Indirect Effects**

The selection of this alternative would have no immediate impact on the Clark's nutcracker and its habitat. All Plant Association Groups with open coniferous forests would continue to provide habitat for this species within the project area. In the long-term, these stands would develop a dense brush and sapling understory and would be at an elevated risk to a high intensity, stand replacing fire. This type of event would remove live trees needed for nesting habitat as well as mature, cone-bearing trees the nutcracker depends upon for food.

**Effects Common to All Action Alternatives**

**Direct and Indirect Effects**

All four action alternatives propose activities such as commercial and small tree thinning, pruning of small diameter trees, disposal of slash, and additional prescribed underburning in ponderosa pine dominated stands, but at different levels of management: Alternative B would restore approximately 6,000 acres of ponderosa pine forest, Alternative C would restore approximately 5,700 acres, Alternative D restores 4,300 acres and Alternative E restores 5,200 acres of ponderosa pine forest. These would result in long term source for nesting habitat and forage.

Outside of commercial harvest units in Alternatives C, D, and E, approximately 5,000 acres of "fuels only" activities would include removal of live trees up to eight inches in diameter as well as brush removal. This would benefit the Clark's nutcracker by increasing its ability to see aerial predators that also inhabit mature pine stands, and would reduce the amount of shrubs and small diameter wood that provides habitat for small mammals such as ground squirrels and chipmunks known to predate on nestlings.

It is possible that any operations (thinning or underburning) conducted during the nesting season may disrupt breeding activities of the Clark's nutcracker. This may result in pairs being displaced into adjacent habitats, although not all sales would be active at the same time, leaving undisturbed nesting habitat widely distributed across the planning area within a five year time period.

**Cumulative Effects**

Table 19 has been reviewed for relevancy and no other actions present or in the foreseeable future, are planned in the Rim-Paunina project area that would impact the Clark's Nutcracker.

## Big Game – Deer and Elk

Assumptions used in the big game analysis:

- Big Game hiding cover was modeled in GIS using the definition of 'six acres or larger' described in the Deschutes Land and Resource Management Plan (DLRMP USDA 1990). This likely under-estimates the actual amount of hiding cover present in each of the subwatersheds. The Deschutes LRMP (WL-54) also defines hiding cover patches as small as ½ acre in size with advance regeneration of trees with residual larger trees present.
- The road and motorized trail densities described in the Rim-Paunina analysis are taken from Alternative E (Preferred) of the Three Trails OHV Project Environmental Impact Statement (EIS) with the Record of Decision signed on December 20, 2010. The road closures would be in place and trail construction in progress at the time Rim-Paunina is ready for implementation.
- No new system roads would be constructed to implement the Rim-Paunina project, although temporary roads would be constructed and then returned to hydrological conditions after the completion of all project actions.
- The Rim-Paunina project area is approximately 40,000 acres. However, the big game analysis was conducted at the watershed level which incorporates all National Forest lands in six subwatersheds of the Little Walker Mountain watershed (see Table 67) which total approximately 40,715 acres. All references to the analysis area in this big game section as well as all effects described refer to this 40,715 acre watershed area.

The Rim-Paunina analysis area provides summer range habitat for mule deer and Rocky Mountain elk. Both mule deer and elk are popular big game species and contribute thousands of recreational visitor days to this area during hunting seasons and for general wildlife viewing opportunities outside the hunting periods. Summering mule deer in the Rim-Paunina area primarily migrate easterly across Highway 97, detouring north or south around Walker Rim to winter ranges in the desert beyond the district and Deschutes National Forest boundary.

***Mule Deer***

The Deschutes Land and Resource Management Plan (DLRMP, FEIS 3-18) states that mule deer populations on the Deschutes National Forest are divided into four herd management units by Oregon Department of Fish and Wildlife (ODFW); Metolius, Upper Deschutes, Paulina, and Ft. Rock. The estimated total wintering population is 25,000 animals. Winter range for each of these herds includes land ownerships other than the Deschutes National Forest and the numbers of deer wintering on the Deschutes National Forest is dependent upon weather conditions. However, the Deschutes Land and Resource Management Plan (DLRMP 4-58)[21] lists four big game management units (Metolius, Upper Deschutes, North Paulina, and South Paulina) with wintering population objectives of 24,900 mule deer. The Ft. Rock management unit is not mentioned in DLRMP 4-58 nor does it list a wintering population objective because the winter range is located on ownerships other than the Deschutes National Forest.

In response to declining mule deer population trends the Oregon Department of Fish and Wildlife (ODFW) initiated a South Central Oregon Mule Deer Telemetry Study beginning in 2005 to monitor mule deer highway mortality and migration patterns along Highways 97 and 31 in central Oregon, where many of these mule deer migrate between summer and winter ranges. Through November 2010 a total of 498 deer have been captured including 95 mule deer in the Ft. Rock big game management unit (Ardt

[21] Deschutes National Forest Land and Resource Management Plan has the Forest-wide Standards and Guidelines for deer and elk from page 4-55 through 4-58.

ODFW pers. comm. 2011). As of February 2011, the study is continuing and may involve additional deer captures in the Metolius and Interstate management units but not in the Ft. Rock, Upper Deschutes, or Paulina units (Ardt ODFW pers. comm. 2011). Preliminary results of data collected by ODFW and Oregon Department of Transportation (ODOT) personnel indicates the majority of mule deer road-kill on Highway 97 occurs in a 40 mile stretch from the junction of Highways 97 and 31 near LaPine south to the junction with Highway 138, south of Chemult, although mortality was significant for the entire 100 miles segment monitored from Bend to Spring Hill (Ardt, ODFW personal comm. 2011). The majority of the deer were killed from May through July, although October is also a high mortality month when animals are migrating to winter ranges. The stretch of Highway 97 between mileposts 191-200 near the junction with Highway 58 is a documented hot spot for deer collisions based on data collected by ODOT and ODFW. The Rim-Paunina project area is within this segment of Highway 97 experiencing high road mortality.

Oregon Department of Fish and Wildlife's (ODFW) initial interpretation of telemetry data collected to date has indicated that some collared animals return to the same summer range area each year suggesting strong site fidelity. In addition, telemetry monitoring has shown the lands south and east of the Two Rivers North subdivision and partially in the project area appear to hold a concentration of collared mule deer (Ardt ODFW pers. comm. 2009). The Crescent Ranger District performed a coarse scale review of the telemetry locations and vegetation, which appeared to show that lodgepole pine/bitterbrush/needlegrass and ponderosa pine/bitterbrush/needlegrass are the two dominant plant associations collared mule deer seem to be keying in on summer ranges on this part of the District. However, data available was not sufficient to determine how these plant associations are being used in relation to stand density, canopy cover, and patch size. Preliminary telemetry data and anecdotal information seems to suggest that mule deer use is heavy on all six subwatersheds of the project area and does not favor any particular watershed over another.

The 40,715 acre Rim-Paunina analysis area is located within the 1,133,551 acre Ft. Rock management unit. The analysis area represents only four percent of the entire management unit acreage and only 250,494 acres of the management unit are located on the Deschutes National Forest, all on the Crescent District. The remaining Ft. Rock unit acreage is either managed by the Fremont-Winema National Forests, Gilchrist State Forest, Bureau of Land Management, or is privately owned. While the Deschutes Land and Resource Management Plan (LRMP) does not list a wintering population objective for the Ft. Rock unit, ODFW has a mule deer management objective (MO) of 11,200 individuals. Deer population trend data for the Ft. Rock Management Unit is displayed in Table 66.

**Table 66. April (2006-2010) Mule Deer Trend Data on the Ft. Rock Management Unit Winter Range Expressed as a Percentage of the Management Objective**

| Management Unit | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Ft. Rock (MO 11,200 animals) | 8,600 – 77% | 5,800 – 52% | 7,800 - 70% | 5,616 – 50% | 5,300 - 47% |

Similar to central Oregon mule deer populations, most of the western United States began experiencing a widespread decline in mule deer populations in the mid-1990s. The Western Association of Fish and Wildlife Agencies (2004) reported there were a multitude of factors adversely impacting mule deer populations including habitat loss to development, deterioration of forage quality and quantity, droughts, severe winter weather, competition with other ungulates, predation, disease, poaching, and increased hunting mortality. As displayed in Table 66, mule deer populations are currently reaching only about 50 percent of the management objectives (MO) for the Ft. Rock unit. Surrounding big game management units including the Upper Deschutes, North and South Paulina are also experiencing similar declines. The

population decline for big game in central Oregon is likely attributable to a combination of several factors. These include residential development, disturbance from an increase in motorized and mechanized recreation, altered migration patterns due to an increase in highway traffic, poaching, and predation also contribute. The enforcement of road closures and hunting regulations have also not kept up with the increase in human population in central Oregon. While deer populations are decreasing, Anglin (ODFW, 2010) stated birth rates expressed as number of fawns produced per 100 does indicate that Oregon herds are healthy though populations are lower than they were historically.

Within the Ft. Rock unit mule deer fawn production is considered to be good, but fewer fawns are surviving to reach winter ranges due to predation, disease, highway crossing mortality, and decreasing forage quality (Hedricks ODFW pers. comm. 2010). Hedricks also stated that buck ratios per 100 do seem to be consistent with historical figures, although there are fewer animals overall. Preliminary data through November 2010 on radio collared adult mule deer mortality (total 156 animals) in central Oregon suggests that of the known mortality factors, illegal harvest (14%), legal harvest (13%), cougar kills (13%), and vehicle collisions (8%) are the primary mortality causes. Fawning deaths, coyote predation, disease, and fences collectively contribute another six percent of the known mortalities (Ardt ODFW pers. comm. 2011). However, 46 percent of the known deer mortalities of the study animals were not attributable to a specific cause. Over time, as more data becomes available in this study, percentages assigned to the various causes of mule deer mortality could change.

***Elk***

There is no official estimate on numbers of elk that summer in the analysis area. However, the Bend Field Office of ODFW estimated approximately 200 elk summer in the 93,000 acre Three Trails OHV analysis area (ODFW 2009) which partially overlaps the Rim-Paunina project area. Because the Rim-Paunina area is less than half the acreage of Three Trails OHV area and does not include large expanses of riparian habitat, elk numbers are assumed to be much less than 200 head. The elk that are present scatter to several winter ranges, with some bands moving westerly across the Cascade Crest onto the Umpqua and Willamette River drainages and some bands moving easterly across Highway 97 into the desert of mixed ownership including the Fremont-Winema National Forests, BLM lands, and privately owned land. The majority of the summering elk occur in small groups along the Little Deschutes River system and the Five Mile Draw lands north of Highway 58 and west of Highway 97 where limited riparian habitats are present for calving and foraging. A few elk also summer near the base of Walker Rim east of Highway 97. Other adjacent calving grounds are thought to include National Forest System lands along the Little Deschutes River just outside the project area.

**Direction**

The Deschutes National Forest Land and Resource Management Plan (DLRMP) provides habitat management direction for big game animals. Mule deer and elk were designated as Management Indicator Species in the DLRMP and management objectives were developed with ODFW because of their status as game animals.

***Mule Deer Hiding Cover***

On mule deer summer range, hiding areas must be present over at least 30 percent of each National Forest implementation unit (DLRMP WL-54). For this analysis the six subwatersheds of the Little Walker watershed have been used to represent the implementation units (see Table 67). Deschutes National Forest acreage in the six subwatersheds ranges from 1,061 acres to 12,598 acres and totals 40,715 acres. To be a suitable hiding area, forested stands must meet one of several conditions including: being six acres or larger and capable of hiding 90 percent of a standing adult deer from view of a human at a distance of 200 feet; being six acres or larger with an average tree height of 6 feet and which has not been thinned in 15 years; or residual clumps of one half acre or larger stands within units with advanced regeneration (trees including whips up to 7 inch diameter) and at least 12 trees per acre with a diameter

greater than seven inches remaining after harvest (DLRMP WL-54). Hiding cover was modeled using a definition of all forested stands with at least 190 trees per acre between 1-10 inches dbh, at least 6.6 feet tall (two meters) and in blocks greater than six acres in size. Table 67 displays the current amount of hiding cover present in the watershed (analysis area) and subwatershed amounts are shown for their individual contributions to the watershed and analysis area as a whole. However, the numbers shown likely under-represent the total amount of hiding cover present because the model utilizes six acres as a minimum patch size.

**Table 67. Existing Hiding Cover within the Six Subwatersheds of the Little Walker Watershed which Comprises the Rim-Paunina Analysis Area**

| Rim-Paunina Analysis Area (Little Walker Watershed) | | |
|---|---|---|
| **6th Field Subwatersheds** | **6th Field Acres Deschutes National Forest System Lands Only** | **Acres and Percent of Existing Hiding Cover** |
| Corral Springs | 2,637 | 1,680 (64%) |
| Crescent Butte | 4,534 | 2,799 (62%) |
| Little Walker Mountain | 12,598 | 8,296 (66%) |
| North Paunina | 10,214 | 4,050 (40%) |
| North Walker | 1,061 | 883 (83%) |
| South Paunina | 9,671 | 6,551 (68%) |
| **Total Acres** | **40,715** | **24,259 (60%)** |

## Road Densities

The Deschutes Land and Resource Management Plan (DLRMP) also has guidelines for road densities with a target level of 2.5 miles per square mile to achieve deer summer range habitat effectiveness targets, unless impacts on deer can be avoided or the proposed project would result in a net benefit to deer habitat. The density would be applied as an average for the implementation unit and would be used as a threshold requiring further analysis. The final judgment on open road density would be based on the further evaluation rather than the density guideline (DLRMP WL-53). Table 68 displays the motorized route densities of roads only as well as roads and trails combined open for public use. Densities were provided by each subwatershed to show their contribution to the Little Walker watershed (Rim-Paunina analysis area) as a whole. Because of the wide range in subwatershed acreages with several containing less than 4,500 acres of Deschutes National Forest land, the Little Walker watershed with a combined 40,715 acres was defined as the implementation unit.

On December 20, 2010 the Record of Decision (ROD) for the Three Trails Off-Highway Vehicle EIS was signed, designating an OHV trail system and closing numerous miles of existing user-created trails and National Forest System roads. In addition, cross-country motorized travel was prohibited under this decision. The six subwatersheds of the Rim-Paunina analysis area almost entirely overlap with the Three Trails OHV project area and are subject to this decision. While the Deschutes National Forest Land and Resource Management Plan (DLRMP 1990) provides guidance for road densities on mule deer summer range it does not mention OHVs in the plan. Because no additional roads or trails are proposed for closure, the densities in Table 68 would remain the same for all Rim-Paunina alternatives. As shown in Table 68 the overall open road density averaged across the analysis area is slightly below the 2.5 miles per square mile target threshold described in the DLRMP.

**Table 68. Motorized Route Densities Expressed in Miles per Square Mile for National Forest System Roads Only and Combined Roads and Trails by Subwatersheds of the Little Walker Watershed**

| Rim-Paunina Analysis Area (Little Walker Watershed) Road and Motorized Trail Densities | | | |
|---|---|---|---|
| **6th Field Subwatershed** | **6th Field Acres National Forest System Lands Only** | **Motorized Density (Roads Only)** | **Motorized Density (Roads + Trails)** |
| Corral Springs | 2,637 | 2.0 | 3.8 |
| Crescent Butte | 4,534 | 3.0 | 3.0 |
| Little Walker Mountain | 12,598 | 2.3 | 4.0 |
| North Paunina | 10,214 | 2.2 | 2.4 |
| North Walker | 1,061 | 0.8 | 0.8 |
| South Paunina | 9,671 | 2.6 | 4.1 |
| **Total** | **40,715** | **2.4** | **3.4** |

***Elk***

Management objectives for elk are described in the DLRMP in WL-42 to WL-51. Specifically, the summer population objectives for the Ft. Rock management unit is 400 animals (DRLMP WL-42), though the expectation is that the populations are found in certain key habitat areas which have the conditions to support summering animals (DLRMP WL-43). There are no Key Elk Areas (KEAs) in the Rim-Paunina analysis area. The nearest ones (Hemlock and Upper Spruce Creek) are located approximately ½ mile west of the analysis area. The estimated January 2010 elk population for the Paulina/East Ft. Rock unit is 400 animals (S. George ODFW pers. comm. 2010). However, not all of these animals would be expected to be located in the Rim-Paunina project area. The DLRMP also specifies habitat conditions to be provided for elk and designated KEAs across the forest. The signing of the Three Trails OHV EIS Record of Decision (ROD) in December 2010 included a forest plan amendment that adjusted the boundaries of the Hemlock Key Elk Area (KEA). Prior to the Three Trails OHV ROD being signed, approximately 200 acres of the 2,511 acre Hemlock KEA fell within the Rim-Paunina project area. As of December 2011 there is no KEA acreage within the Rim-Paunina boundary and no further discussion of KEA is needed.

Roads have long been identified as having impacts on big game populations. Recent studies at the Starkey Project in northeast Oregon (Wisdom 2005) have disclosed even more information on the effects of roads and road densities on deer and elk. Rowland et al. (2005) summarized the direct impacts of roads and associated traffic on elk, in addition to outright mortality from vehicular collisions, as follows: (1) Elk avoid areas near open roads with variability in response to traffic rates; (2) Elk vulnerability to mortality from hunter harvest, both legal and illegal, increases as open road density increases; and (3) In areas of higher road density, elk exhibit higher levels of stress and increased movement rates. Rowland (2005) also noted that elk use increased as distance from open roads increased and suggested that judicious closing of certain road segments, particularly road spurs, may retain or create blocks of habitat that serve as security areas for elk while allowing sufficient road access for other management needs. Hillis et al. (1991 cited in Wisdom 2005) suggested security areas be a non-linear block of hiding cover at least 250 acres in size and at least one-half mile from roads open to motorized traffic. The Rowland et al. (2000) study at Starkey showed elk response to open roads diminished markedly at a distance of 1,969 yards (1.1 miles).

Other research at Starkey found strong evidence, although observational, that mule deer avoided elk and tended to select areas near roads as a means of avoiding elk (Johnson et al. 2000; Coe et al. 2001). However, Wisdom et al. (2005) cautioned against inferring these results to areas where elk are absent or sparse. In the Rim-Paunina area, mule deer are much more common than elk and there is no evidence to suggest that deer would selectively utilize lands adjacent to roads.

Because the literature listed above has shown big game animals, particularly elk, are known to be sensitive to motorized disturbance, a distance banding analysis was conducted for this project. Three distances were selected to measure edge effects based on research by Forman (2000), Hillis et al. (1991), and Rowland et al. (2000). The 660 foot buffer zone was chosen because of increased animal vulnerability to legal and illegal harvest adjacent to open roads and motorized trails. The one-half mile buffer distance was chosen to represent lands offering a moderate level of elk security. The third banding distance of one mile was selected to show where motorized disturbance diminished markedly for elk. However, analysis concluded there is no acreage greater than one mile from an open or motorized trail. Analysis was also completed on the number of security blocks for elk larger than 250 acres in size and greater than ½ mile from an open route also shown in Table 69. An assumption used in the analysis is that acreage within 660 feet of an open road or motorized trail is unavailable for consistent elk use as cover or foraging areas at least during daylight hours when motorized traffic is more likely to occur.

**Table 69. Results of Banding Analysis**

| Banding Distance Applied | Alternatives A, B, C, D, and E |
|---|---|
| Acres of National Forest land <660 feet from an open motorized route and percent of the analysis area | 23,475 (58%) |
| Acres and percent of National Forest land greater than ½ mile from an open motorized route | 1,535 (4%) |
| Acres and percent of National Forest land greater than one mile from an open motorized route | 0 |
| Number of 250 acre elk security blocks greater than ½ mile from an open motorized route | 3 |

The analysis completed and shown in Table 69 illustrates that 58 percent of the existing National Forest land base in the analysis area is less than 660 feet from an open road or motorized trail. This is the result of the decision made in the Three Trails OHV EIS to provide vehicle access including OHVs. The same decision also resulted in four percent of the analysis area being greater than ½ mile from open routes and three blocks of security habitat that are greater than 250 acres in size. Because Rim-Paunina does not propose any adjustments in road or trail densities, the numbers provided in Table 69 would remain the same in all alternatives.

### Analysis of Effects to Big Game Habitat

*Key Indicators for Big Game Habitat*

Effects to big game will be displayed at the watershed and 6th-field subwatershed scale and the following indicators will be used to compare the effects of alternatives on big game:

- *Percentage of hiding cover present in each subwatershed and the watershed as a whole*
- *Acres and percent of Deschutes National Forest land providing hiding cover <660 feet from an open motorized route.*

Table 70 displays a summarization of the predicted effects of the proposed action and alternatives on big game.

**Table 70. Comparison of Key Indicators for Big Game by Alternative**

| Key Indicators | Alternative | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| Acres and percent of National Forest land defined as hiding cover in the Little Walker watershed (analysis area) post- treatment | 24,259 (60%) | 18,021 (44%) | 16,940 (42%) | 16,940 (42%) | 16,020 (39%) |
| Acres and percent of National Forest land providing hiding cover <660 feet from an open motorized route in the Little Walker watershed | 13,642 (58%) | 9,254 (39%) | 8,272 (35%) | 8,272 (35%) | 7,690 (33%) |

## *Environmental Consequences*

### Direct and Indirect Effects Common to All Alternatives

*Motorized Vehicle Access* - The signing of the Three Trails OHV Record of Decision (ROD) in December 2010 resulted in a lowering of road densities and combined road and trail densities in the six subwatersheds, which overlap with the Rim-Paunina analysis area and are displayed in Table 68. There are no roads or motorized trail closures planned for the Rim-Paunina project, therefore the densities shown by subwatershed and as an analysis area as a whole would remain the same in all alternatives. Because the analysis shows a 2.4 mile per square mile road only density in all alternatives, implementation of the Rim-Paunina project would be consistent with the Deschutes Land and Resource Management Plan guidelines for deer summer range. The road closures implemented with the Three Trails OHV decision benefit deer and elk by restricting motorized access to designated roads and trails and eliminating cross-country motorized travel in the Rim-Paunina analysis area. In addition, other road closures including the Green Dot Closure for Walker Rim and the Paunina Code of Federal Regulation (CFR) closure between Highway 58 and Highway 97 also contribute to benefitting big game by reducing motorized disturbance to summering animals.

*Distance Banding Analysis* - Due to the existing road and motorized trails open for public travel, analysis concluded there was no National Forest acreage greater than one mile from an open route, meaning that no high quality security habitat for elk exists in the project area. This was also the condition prior to the signing of the Three Trails OHV Environmental Impact Statement (EIS) and Record of Decision (ROD). Banding analysis of National Forest lands showed that 1,535 acres (4 percent) of the analysis area is located greater than ½ mile from an open route. A total of six blocks ranging in size from 59 acres to 571 acres accounted for the entire acreage greater than ½ mile from an open route. The largest amount of acreage is located in the North Paunina subwatershed (571 acre block) followed by a 402 acre block on Walker Rim in the Crescent Butte subwatershed. Smaller patches ranging from 59 acres to 178 acres are also present in the North Walker, Corral Springs, and Little Walker Mountain subwatersheds. Because of the minimal amount of acreage greater than ½ mile from an open motorized route capable of providing security habitat for elk in the analysis area, this acreage is likely more valuable to deer than elk. It is expected that elk utilizing the project area would continue to experience high levels of disturbance from motorized use in the majority of the analysis area. Johnson et al. (2004) stated that elk trying to elude hunters can deplete fat reserves needed for over-wintering survival and that elk responded to hunters by fleeing disturbances, whereas deer appear to elude hunters by hiding. Cook et al. (2005) reported that the effects of summer-autumn nutrition on fat accretion of cows and growth of calves significantly influenced their survival probability under harsh winter conditions. Consequently, if elk are spending more time running from disturbances they are spending less time foraging to build up fat reserves needed for survival. Having to move away from disturbances also reduces their existing fat reserves. This could lead to higher winter mortality.

Banding analysis was also conducted for National Forest acreage within 660 feet of an open road or trail. Table 69 shows that a total of 23,475 acres or 58 percent of the analysis area is within this distance band. This figure would remain the same for all alternatives. This banding distance adjacent to roads is

important because of the potential for animal visibility from motorized routes, although visibility is also dependent on topography and the presence of tree or shrub cover for screening. High animal visibility in this distance band would tend to increase the potential for deer and elk harvest. The 42 percent of the land base that is outside the 660 foot band would tend to benefit deer more than elk because the Starkey research has shown elk have greater sensitivity to open roads and travel further distances when disturbed. Analysis also shows that there is no high quality security habitat greater than one mile from an open road or trail in the analysis area. The Rowland et al. (2000) study at Starkey showed elk response to open roads diminished markedly at a distance of 1,969 yards (1.1 miles).

*250 Acre Security Habitat Blocks for Elk* – As previously mentioned, Hillis et al. (1991 cited in Wisdom 2005) suggested security areas be a non-linear block of hiding cover at least 250 acres in size and at least one-half mile from roads open to motorized traffic. Because no new system roads are proposed to be built or additional roads or motorized trails closed in any alternative, there would be no change in the number of, amount of acreage within, or distribution of security habitat blocks. The distance banding analysis concluded, based on the road and trail network, security blocks greater than 250 acres in size are restricted to two adjoining blocks totaling 571 acres in the North Paunina subwatershed (within the Paunina CFR closure area) between Highway 58 and Highway 97 and one block totaling 402 acres in the Crescent Butte subwatershed on Walker Rim. Because the number of large blocks is limited, elk utilizing the project area would continue to experience high levels of disturbance from motorized use in the majority of the analysis area with effects as described in the previous paragraph.

*Executive Order 13443* – This order was signed by President Bush on August 13, 2007 and is intended to enhance hunting opportunities on federal public lands. The stated purpose of the Executive Order is to "…direct federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management, including the Department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitats." The selection of any alternative of the Rim-Paunina vegetation project would result in no loss of hunting land acreage and motorized hunting access would be maintained within the National Forest System lands.

**Direct and Indirect Effects on Big Game Habitat**

**Alternative A**

*Forest Management Activities (Tree removal and prescribed burning)*

Because no forest management would occur with this alternative, there would be no change in the current amount and distribution of hiding cover in each subwatershed. As shown in Table 72, with the exception of the North Paunina subwatershed, all subwatersheds have greater than 60 percent hiding cover, well above the Deschutes Land and Resource Management Plan minimum of 30 percent. In the North Paunina subwatershed the existing level is at 40 percent as a result of past mountain pine beetle attacks, subsequent salvage harvest, commercial thinning treatments, and prescribed burning in ponderosa pine dominated stands. Over time there would be a gradual increase in the amount and distribution of hiding cover across the project area as a result of increased tree growth and/or stem density. Cross-country motorized travel is restricted and the existing level of hiding cover at 58 percent within 660 feet of roads would be maintained. In addition, there would be no loss of antelope bitterbrush from prescribed burning operations, which would continue to provide the primary forage base for mule deer in the project area. Based on these conditions, it is expected the mule deer population for this portion of the Ft. Rock management unit herd would be maintained at current levels. However, these animals would still be subject to mortality factors including winter range habitat conditions located off the Crescent District, as well as extreme weather conditions, highway crossing mortality, predation, and disease.

**Common to All Action Alternatives (B, C, D, and E)**

***Forest Management Activities (Tree removal and prescribed burning)***

Each action alternative proposes a combination of commercial thinning treatments, small diameter tree removal and fuels treatments that would change the vegetative character of affected stands. In most instances the reduction in tree densities would open the forested stands resulting in increased visibility and loss of hiding cover for big game. Conversely, opening these stands would increase the amount of sunlight reaching the forest floor and result in increased growth potential to forage species. This would include antelope bitterbrush and, where prescribed burning would occur, an increase in native bunch grasses. Prescribed underburning could occur in the spring or fall depending on conditions favorable for burning. Underburning would generally be conducted in ponderosa pine dominated forests, which are present in each of the six subwatersheds of the project area. However, the most consolidated ponderosa pine stands are located between the eastside of Highway 97 to the base of Walker Rim. Prescribed burning would generally have two major impacts to big game. First, it is assumed that prescribed underburning in ponderosa pine dominated stands would be placed on a burning cycle of every 8-15 years. This short time frame would generally not allow for the re-establishment of forested hiding cover for the short- or long-term. Hiding cover would be restricted to treatment unit retention areas and untreated stands in the project area. A mitigation measure has been included in Chapter 2 to place no treatment retention areas currently functioning as hiding cover next to open roads and motorized trails wherever possible to lessen the impact of reduced hiding cover.

The second impact of burning is the removal of antelope bitterbrush, which is the dominant forage species for mule deer in this area. Busse and Reigle (2008) conducted a study on the Deschutes National Forest on the response of bitterbrush to repeated prescribed burning in ponderosa pine forests. Their study had several major conclusions, including that low- to moderate-intensity spring burning killed the majority of the bitterbrush plants on replicate plots. Results from the 15-year study showed that the presence of bitterbrush was significantly altered by repeated burning. The initial burns resulted in a short-term collapse in bitterbrush cover followed by a fairly rapid recovery period. In 2002 a repeat underburning was accomplished and although it did not eliminate bitterbrush from the forest understory, it did substantially reduce seedling recruitment and total cover. Average recruitment (seed germination plus basal sprouting) was 2-6 fold lower after the 2002 burns compared to the 1991 burns. Fifteen years after the initial burn, bitterbrush cover was 75-92 percent lower on the repeatedly-burned plots compared to unburned plots and much of the decline was attributed to seedbank depletion with insufficient time between burn cycles to develop and replenish the seed crop. They concluded that repeated burning is an effective tool to reduce the presence of bitterbrush and modify its function as both a wildlife browse and a ladder fuel.

As previously stated, the prescribed fire cycles proposed in the Rim-Paunina area may range from 8-15 years - within the timelines described by Busse and Reigle (2008). Therefore, it is reasonable to assume underburning would result in a short- and long-term reduction in bitterbrush abundance in all six subwatersheds and particularly in the Crescent Butte and Little Walker Mountain watersheds that are heavily dominated by ponderosa pine and have prescribed fire as a proposed fuels treatment. Prior to any prescribed burn for this project, as with any prescribed burning project on the District, an implementation plan would be developed and reviewed by district specialists. Typical mitigation measures added to the plan include the retention of 30-40 percent of the shrub communities including bitterbrush in unburned islands for the benefit of big game, small mammals, and songbirds. This measure has been shown to be effective based on past burning operations and would help maintain bitterbrush distributed across each treatment unit.

Prescribed burning would also result in a short-term loss of forage and cover currently provided by dense patches of ceanothus and manzanita near the base of Walker Rim. The total acres of this condition are unknown although burning would likely kill most of their above ground vegetation immediate re-

sprouting would occur providing desirable forage in the first few years after burning. The disturbance associated with prescribed burns would be a short-term localized effect normally limited to one or two days while timber sales could be in operation for several months up to two years. This has the potential for deer to avoid these disturbance areas during spring and fall migrations (April-June) and (October-November). Daytime avoidance of these areas would probably occur but animals could still move through the burn or timber sale areas after dark. There should be no long-term negative effects on mule deer migration through the Rim-Paunina project area.

In addition, Project Design Features and Mitigation Measures (see Chapter 2) include a provision for the retention of untreated acreage for various resource concerns including big game hiding cover, dense canopied stands, raptor nest stands, heritage sites, dense concentrations of snags and down wood, shrub patches for foraging or nesting, or other desired features. In all action alternatives it is reasonable to assume some shift in big game distribution may result from the reduction in bitterbrush cover in the project area. Those stands not selected for thinning and burning and lodgepole pine dominated stands may experience greater mule deer use because of the greater availability of bitterbrush.

Several mitigation measures have been proposed (see Chapter 2) that would lessen effects on deer and elk. A number of treatment units would have a limited operating period applied during the deer fawning/elk calving period of May 1 – June 30. Disturbance activities such as spring burning and timber harvest would be restricted on units near water sources to reduce the potential of fawn and calf mortality from abandonment. As previously mentioned, the placement of no treatment retention clumps providing cover would be preferentially directed near open roads and trails where feasible. A minimum six acre hiding cover clump would be left surrounding guzzlers listed in the Mitigation Measures in Chapter 2.

Table 71 displays the change in hiding cover condition in each subwatershed as a result of implementing each action alternative. None of the alternatives would fall below the 30 percent cover level objective specified in the Deschutes Land and Resource Management Plan (WL-54). The amount of hiding cover presented in Table 71 represents stands equal to or greater than six acres in size and also includes hiding cover present that would be left in no treatment retention clumps (15-25 percent) specified in the Project Design Features of Chapter 2. However, the numbers provided in Table 71 also likely under-represents the actual amount of hiding cover present in stands less than six acres in size.

**Table 71. Acres of Hiding Cover Removed and the Percent of the Little Walker Watershed Remaining as Hiding Cover by Alternative as a Result of Proposed Vegetation Management**

| 6th Field Subwatershed | 6th Field Acres Deschutes National Forest System Lands Only | Acres and Percent of Existing Hiding Cover Alt A | Acres of Hiding Cover and Percent Remaining Alt B | Acres of Hiding Cover and Percent Remaining Alt C | Acres of Hiding Cover and Percent Remaining Alt D | Acres of Hiding Cover and Percent Remaining Alt E |
|---|---|---|---|---|---|---|
| Corral Springs | 2,637 | 1,680 (64%) | 1,406 (53%) | 1,179 (45%) | 1,179 (45%) | 1,166 (44%) |
| Crescent Butte | 4,534 | 2,799 (62%) | 1,376 (30%) | 1,824 (40%) | 1,824 (40%) | 1,376 (30%) |
| Little Walker Mountain | 12,598 | 8,296 (66%) | 6,240 (51%) | 5,153 (41%) | 5,153 (41%) | 5,037 (40%) |
| North Paunina | 10,214 | 4,050 (40%) | 3,128 (31%) | 3,180 (31%) | 3,180 (31%) | 3,063 (30%) |
| North Walker | 1,061 | 883 (83%) | 661 (62%) | 325 (31%) | 325 (31%) | 325 (31%) |
| South Paunina | 9,671 | 6,551 (68%) | 5,210 (54%) | 5,279 (55%) | 5,279 (55%) | 5,053 (52%) |
| **Total Acres** | 40,715 | 24,259 (60%) | 18,021* (44%) | 16,940* (42%) | 16,940* (42%) | 16,020* (39%) |

*Hiding cover includes each unit's retention areas plus all acres not proposed for thinning or fuels treatment. Hiding cover acreage listed above only measures polygons equal to or greater than 6 acres in size and under-represents actual amount of cover.

Table 72 has combined the data from previous tables in this section and displays the amount of National Forest System acreage within each subwatershed within 660 feet of an open road or motorized trail, the

amount of land currently defined as hiding cover, and the amount of hiding cover within 660 feet of open roads and trails post-treatment. The intent is to show the distribution of hiding cover across the analysis area and how the amount of hiding cover adjacent to roads changes between alternatives. Generally speaking, less hiding cover adjacent to roads equals more disturbance to deer and elk foraging or traveling through the subwatersheds and an increased risk of animal mortality from legal and illegal harvest. However, topographic features such as hills, draws, and/or high shrub cover where available, may partially compensate for low amounts of hiding cover. As previously mentioned, the hiding cover amounts listed represent only blocks equal to or greater than six acres in size. This would likely under-represent the actual amount of hiding cover present within the 660 foot disturbance zone analyzed.

**Table 72. Hiding Cover Acreage on National Forest System Lands within Each Subwatershed within 660 feet of a Road or Trail Open for Motorized Use Pre- and Post-Treatment**

| Subwatershed | Subwatershed Acres | Open Road *and Combined Road and Trail** Density | Alternative | Acres of Hiding Cover in Subwatershed | Subwatershed Acres Within 660' of Open Motorized Route | Hiding Cover Within 660' of Open Motorized Route |
|---|---|---|---|---|---|---|
| Corral Springs | 2,637 | 2.0* - 3.8** | A | 1,680 – 64% | 1,674 – 63% | 1,178 – 70% |
| | | | B | 1,406 – 56% | | 895 – 64% |
| | | | C and D | 1,179 – 45% | | 655 – 56% |
| | | | E | 1,166 – 44% | | 634 – 53% |
| | | | | | | |
| Crescent Butte | 4,534 | 3.0* - 3.0** | A | 2,799 – 62% | 2,197 – 48% | 1,137 – 52% |
| | | | B | 1,376 – 30% | | 299 – 14% |
| | | | C and D | 1,824 – 40% | | 566 – 26% |
| | | | E | 1,376 – 30% | | 299 – 14% |
| | | | | | | |
| Little Walker Mountain | 12,598 | 2.3* - 4.0** | A | 8,296 – 66% | 8,026 – 64% | 5,219 – 65% |
| | | | B | 6,240 – 51% | | 3,444 – 43% |
| | | | C and D | 5,153 – 41% | | 2,799 – 35% |
| | | | E | 5,037 – 40% | | 2,726 – 34% |
| | | | | | | |
| North Paunina | 10,214 | 2.2* - 2.4** | A | 4,050 – 40% | 5,139 – 50% | 2,118 – 41% |
| | | | B | 3,128 – 31% | | 1,561 – 30% |
| | | | C and D | 3,180 – 31% | | 1,429 – 28% |
| | | | E | 3,063 – 30% | | 1,343 – 26% |
| | | | | | | |
| North Walker | 1,061 | 0.8* - 0.8** | A | 883 – 83% | 301 – 28% | 242 – 80% |
| | | | B | 661 – 62% | | 140 – 47% |
| | | | C and D | 325 – 31% | | 104 – 35% |
| | | | E | 325 – 31% | | 103 – 35% |
| | | | | | | |
| South Paunina | 9,671 | 2.6* - 4.1** | A | 6,551 – 68% | 6,138 – 63% | 3,748 – 61% |
| | | | B | 5,210 – 54% | | 2,915 – 47% |
| | | | C and D | 5,279 – 55% | | 2,719 – 44% |
| | | | E | 5,053 – 52% | | 2,585 –42% |

* Open Road Only Density ** Combined Road and Trail Density

### *Disturbance to Big Game*

The existing road and motorized route densities assume full implementation of the Record of Decision for the Three Trails OHV project. None of the Rim-Paunina action alternatives propose the construction of new permanent roads in the project area or the closure of additional existing roads. However, temporary roads would need to be constructed to facilitate the economical removal of timber from treatment units. These would be relatively short segments that would normally be open for 2-3 years for timber sale

completion and associated post-sale activities including post and pole sales and fuels reduction work. All temporary roads would be closed to motorized travel with the placement of barricades or berms and subsoiled to allow their return to proper hydrologic function after the completion of all activities. Therefore, the system roads and motorized route densities listed in Table 68 would not change between any of the alternatives. The impact on deer and elk would be described as short-term, lasting a couple years, with elk tending to avoid open roads as noted by Rowland et al. (2005) from a study in the Blue Mountains of Oregon. For deer, access to nearby hiding cover may help partially mitigate the disturbance from motorized traffic on roads and trails. Projected temporary road needs for Alternative B are 9.2 miles, for Alternatives C and D a total of 6.5 miles and for Alternative E 8.3 miles. It is highly unlikely that all vegetation treatments would be conducted in the same year; therefore there would be areas where activities are not occurring and providing relatively disturbance free land, particularly for deer.

In all alternatives, those subwatersheds with the highest road densities would tend to retain greater amounts of hiding cover. For example, motorized densities for South Paunina are 2.6 mi/mi$^2$ for roads and 4.1 mi/mi$^2$ for roads and motorized trails, and cover is retained above the 50 percent level. For Little Walker Mountain the densities are 2.3 mi/mi$^2$ and 4.0 mi/mi$^2$ respectively, but hiding cover levels would stay above 40 percent in each alternative. An exception would be the Crescent Butte subwatershed, where road and road + trail densities are 3.0 mi/mi$^2$ and 3.0 mi/mi$^2$ respectively, but hiding cover would fall to 30 percent in Alternatives B and E. In the North Paunina subwatershed, with road and road plus trail densities at 2.2 mi/mi$^2$ and 2.4 mi/mi$^2$ respectively, hiding cover would be down to the 30 percent level in all action alternatives. All alternatives would meet Deschutes Land and Resource Management Plan direction for hiding cover using the entire Little Walker watershed as the implementation unit.

All action alternatives would be expected to have similar effects on elk that utilize the project area. There would be no change in the number of 250 acre habitat blocks that Hillis et al. (1991) described as providing security cover for elk. Because no roads or trails are proposed for closure in Rim-Paunina, there would be no change between action alternatives in the amount of land base that is greater than ½ mile from an open motorized route. All action alternatives propose a reduction in hiding cover within each subwatershed and adjacent to roads and trails open for vehicle use. Therefore, a reduction in hiding cover would equate to an increase in animal visibility and may result in a few additional bull elk taken legally and/or a few more animals of either sex taken illegally near open roads. While some additional elk mortality may occur, the analysis area is not considered a high use elk area nor was it designated a Key Elk Management Area in the Deschutes Land and Resource Management Plan. Rim-Paunina has a smaller elk population compared to other drainages on the Crescent Ranger District such as the Hemlock, Spruce, and Swamp Creek meadow complexes and the lands surrounding Big Marsh.

## Specific to Each Action Alternative

### Alternative B

***Forest Management Activities (tree removal and prescribed burning)***

Implementation of this alternative would reduce big game hiding cover in each of the six subwatersheds in the project area, though it would retain the greatest amount of hiding cover of the four action alternatives. As shown in Table 71, the Crescent Butte and North Paunina subwatersheds would have hiding cover levels at or near 30 percent, although the remaining subwatersheds would retain hiding cover levels from 44 to 62 percent post-treatment. Measured over the entire analysis area hiding cover would drop from 60 percent to 44 percent of the National Forest land base. Within 660 feet of open roads and trails Alternative B would retain the greatest amount of hiding cover, though the percentage would drop from a current 58 percent down to 39 percent. However, this amount does not factor in the placement of no treatment retention areas near roads and trails as described in the Project Design Features (see Chapter 2), which would increase hiding cover within this banding distance above that shown in Table 72. This would also be consistent with Deschutes Land and Resource Management Plan WL-58 that states, if

possible, leave strips of trees along roads to reduce view distances. Although there is no Deschutes Land and Resource Management Plan threshold identified for a minimum level of hiding cover adjacent to roads, the vegetation treatments in the Crescent Butte subwatershed would reduce road-side hiding cover down to 14 percent. The North Paunina subwatershed would have the next lowest level of hiding cover adjacent to open roads, falling to 30 percent.

In addition to the commercial thinning treatments, prescribed underburning is proposed on up to 8,506 acres (21percent of the project area) with the vast majority in the ponderosa pine plant associations. The greatest amount of burning would take place in the Crescent Butte and Little Walker Mountain subwatersheds. As previously described, this activity and regularly scheduled future burns would result in a long-term loss of hiding cover and the reduction and distribution of bitterbrush as mule deer forage. In the prescribed burn areas, some shifting of animal use may occur into adjoining areas where bitterbrush forage is in greater supply, though mitigation measures for retention areas would be applied in prescribed burn units and commercial timber sale treatments. The combination of thinning and prescribed burning would still maintain hiding cover at levels in excess of 30 percent measured at the watershed scale and therefore, would meet Deschutes Land and Resource Management Plan direction.

**Alternative C**

***Forest Management Activities (tree removal and prescribed burning)***

Similar to Alternative B, this alternative would reduce big game hiding cover in each of the six subwatersheds in the project area. It would retain the second highest amount of hiding cover of the four action alternatives. As shown in Table 71, two subwatersheds (North Paunina and North Walker) would have hiding cover levels very near the 30 percent level although the remaining subwatersheds would retain hiding cover levels from 40 to 55 percent post-treatment. Measured over the entire analysis area hiding cover would drop from 60 percent to 42 percent of the National Forest land base. The most noticeable changes from Alternative B are an increase in hiding cover retention in the Crescent Butte subwatershed and a decrease in hiding cover in the North Walker subwatershed.

Hiding cover within 660 feet of open roads and trails would be reduced from the current 58 percent to 35 percent. It is assumed the amount of hiding cover near roads would increase with the 15-25 percent no treatment retention areas deliberately placed adjacent to roads. The level of hiding cover retained near roads would be similar to Alternative B in North and South Paunina subwatersheds but would result in reductions in hiding cover in the Corral Springs, Little Walker Mountain, and North Walker subdivisions. Crescent Butte is the only subwatershed that would experience an increase in hiding cover adjacent to roads as compared to Alternative B.

In addition to the commercial thinning treatments, prescribed underburning is proposed on up to 12,762 acres (32 percent of the project area) with the majority in the ponderosa pine plant associations. Similar to Alternative B, regularly scheduled burning would likely result in a long-term loss of hiding cover and reduction in the amount and distribution of bitterbrush as mule deer forage. The combination of thinning and prescribed burning would still maintain hiding cover at levels exceeding 30 percent measured at the watershed scale and therefore, would meet Deschutes Land and Resource Management Plan direction.

**Alternative D**

***Forest Management Activities (tree removal and prescribed burning)***

The selection of Alternative D would have similar effects to those described in Alternative C, because the same units and acres for treatment are proposed. The major difference with Alternative D compared to Alternative C is that a total of approximately 778 acres of two to five acre gaps would be created primarily in the Crescent Butte subwatershed with lesser amounts in the North Paunina and Little Walker Mountain subwatersheds. While this would result in a reduction in hiding cover similar to the commercial thinning proposed in the other action alternatives, Alternative D would propose underplanting

tree seedlings in the gaps. The planted trees would grow into hiding cover in about ten years, though the gaps would be less than the six acre minimum patch size that was utilized to model hiding cover in this analysis. Prescribed burning within the planted gaps would not occur until the trees reach about 30 years of age (J. Bowles pers. comm. 2011) which would allow these small hiding cover clumps to function as cover for up to two decades. Because underburning would also be delayed for several decades until the planted trees reach approximately 30 years of age, bitterbrush re-establishment is also likely and available for big game until maintenance burns are started once again on an 8-15 year cycle. These actions would help partially mitigate the loss of and better distribute hiding cover and big game forage in the Crescent Butte, North Paunina and Little Walker Mountain subwatersheds. This would benefit mule deer in the subwatersheds by reducing at least minimally, their susceptibility to road-side legal and illegal harvest for several decades. The combination of thinning and prescribed burning would still maintain hiding cover at levels exceeding 30 percent measured at the watershed scale and therefore, would meet Deschutes Land and Resource Management Plan direction.

**Alternative E**

***Forest Management Activities (tree removal and prescribed burning)***

Alternative E would result in the greatest loss of big game hiding cover of the four action alternatives with 39 percent of the analysis area providing hiding cover post-treatment. An additional 2,000 acres of hiding cover would be removed compared to Alternative B and approximately 920 acres less compared to Alternatives C and D. Within 660 feet of open roads and trails, hiding cover would be reduced to 33 percent, the lowest of the four action alternatives. However, similar to the other action alternatives, hiding cover would still be maintained at or above the Deschutes Land and Resource Management Plan levels, consistent with direction for mule deer summer range.

Alternative E proposes approximately 1,921 acres of alternative mistletoe treatments in the most severely infected stands, where all infected trees under 21 inches in diameter would be removed. No trees greater than 21 inches in diameter would be removed; however, infected trees greater than 21 inches in diameter could have induced mortality. This would occur through tree topping, blasting, or burning with the objective of reducing the impact of mistletoe raining down the infection onto the understory trees. These actions would occur primarily in the Crescent Butte subwatershed with lesser amounts in the North Paunina and Little Walker Mountain subwatersheds. After tree removal, prescribed burning would occur, followed by tree planting of ecologically appropriate species. These planted areas would be capable of becoming hiding cover in about ten years and remain hiding cover until pre-commercial thinning occurs at about 30 years of age. Bitterbrush re-establishment after the initial burn following the mistletoe treatment on the 1,921 acres is also possible. This would last until underburns are conducted again when the planted trees reach approximately 30 years of age. This would help partially mitigate the loss of and better distribute hiding cover and big game forage in the Crescent Butte, North Paunina and Little Walker Mountain subwatersheds for several decades once re-established. It would also benefit mule deer in the subwatersheds by reducing, at least minimally, their susceptibility to road-side legal and illegal harvest.

In addition to the commercial thinning treatments, prescribed underburning is proposed on up to 13,491 acres (34 percent of the project area) in the ponderosa pine plant associations. This is the highest level of treatment proposed of all four action alternatives and result in the greatest change in the amount and distribution of bitterbrush and other shrubs in the analysis area. Mitigation measures previously mentioned for retention of browse species (bitterbrush, ceanothus, manzanita) would be included in the prescribed burn plans for all action alternatives to retain a well distributed network for big game but also benefitting resident and neotropical birds, and small mammals.

**Cumulative Effects**

The following projects overlap in time and have a zone of influence that overlaps the Rim-Paunina project. The Three Trails OHV EIS (USDA 2010) designated an OHV trail system, closed 94 miles of

user-created OHV trails and 115 miles of Forest Service System roads on a 93,016 acre project area that partially overlaps the Rim-Paunina project area. The effects for big game on the preferred Alternative (E) concluded that road and user-created trail closures would benefit deer and elk by increasing the amount of undisturbed habitat available to the animals, by increasing the number of large block security areas greater than 250 acres in size, clustering OHV trails where possible to minimize the amount of lands subject to motorized disturbance, and finally by adjusting the boundary of the Hemlock Key Area to incorporate more wet meadow habitat and reducing road densities. The road and trail system open for motorized use as identified in the Record of Decision (ROD) for Three Trails OHV EIS was used as the existing condition for determining road and trail densities for the Rim-Paunina big game effects.

The Deschutes National Forest signed a Forest-wide Travel Management Plan decision in August 2011 to review and make recommendations to our current motorized access system. At this time there are no additional road and/or trail closures planned in the Rim-Paunina project area as a result of implementing the Forest-wide Travel Management decision.

The small diameter thinning program would overlap the Rim-Paunina project area. Small tree thinning is an annual activity with the vast majority of the acreage within young tree plantations. This activity has been accounted for up to the present. For the next several years no additional small diameter thinning other than Rim-Paunina activity units would be programmed within the Little Walker watershed until hiding cover increases in the subwatersheds. At that time another hiding cover analysis would be conducted to determine how much acreage has grown into hiding cover in the watershed and its distribution across the 40,000 acre area.

Approximately 106 acres of the Two Rivers North housing subdivision is within the boundary of the Rim-Paunina project. This acreage is developed with homes occupied year-round and/or used as summer homes. This small amount of acreage was not considered capable of supporting hiding cover for the short- or long-term and was not used in the analysis.

The BLT Vegetation EIS (USDA 2009) which is currently being implemented is included in the cumulative effects discussion even though it does not overlap the Rim-Paunina analysis area. The two projects are in separate but adjoining watersheds, and also both within the Ft. Rock management unit, of which 250,494 acres (22 percent) of the 1,133,551 acre management unit is on the Crescent District. The BLT project proposed commercial and small diameter tree thinning and prescribed burning similar to that proposed for Rim-Paunina. The EIS stated post-treatment hiding cover would remain above the Deschutes Land and Resource Management Plan minimums. The road closures approved for the Three Trails OHV EIS also overlap the BLT EIS analysis area and resulted in benefits to big game. Therefore, no adverse cumulative effects are expected in combination with Rim-Paunina.

**Conclusions**

***Mule Deer*** – The selection of any action alternative would result in an improvement to foraging habitat where commercial thinning is proposed, particularly in denser stands of lodgepole pine. Antelope bitterbrush is expected to favorably respond as a result of increased sunlight reaching the plants. Conversely, commercial and small diameter thinning would result in a reduction of big game hiding cover in several subwatersheds down to the minimum levels stated in the Deschutes Land and Resource Management Plan. Where regular prescribed burning is planned in ponderosa pine stands, the loss of bitterbrush as a forage species would be a long-term event. For these reasons, Alternative E would have the greatest negative effect to mule deer because it results in the least amount of hiding cover adjacent to open roads and trails leaving animals more susceptible to legal and illegal hunting pressure. Alternative E also proposes the most acreage planned for prescribed underburning resulting in reduced bitterbrush cover available for foraging animals.

However, connected actions associated with Alternatives D and E for mistletoe control would provide some temporary mitigation to the loss of hiding cover and antelope bitterbrush. Alternatives D and E propose underplanting of tree seedlings (approximately 778 acres in Alternative D and up to 1,921 acres in Alternative E) following mistletoe treatments. Because the seedlings would be susceptible to underburning, these trees would be allowed to grow until approximately age 30 at which time maintenance burns could be scheduled on a 8-15 year rotation. This would allow a short time frame of approximately two decades where hiding cover would be available and where bitterbrush could re-sprout for big game browse until the next burning cycle. Once burning is established on a regular 8-15 year cycle, bitterbrush loss would be a long-term effect as described earlier. The short-term increase in hiding cover would help offset the loss of hiding cover near motorized routes, though the hiding cover may not be present long-term. Alternatives C and D would be described as mid-range in effects because of the amount of acres treated for thinning and burning. Alternative B is expected to have the least impact to big game because it would treat the fewest acres.

For all action alternatives, summering mule deer populations would be maintained, though there may be some adjustment of animals moving where cover and forage are available in close proximity to each other in the analysis area. The Project Design Features and mitigation measures collectively, would also help lessen negative effects to deer. As previously mentioned, mule deer are subject to numerous mortality factors including events such as extreme weather and habitat conditions on winter ranges that are located outside the analysis area and off the Deschutes National Forest. Therefore, the relatively modest amount of hiding cover removed with the Rim-Paunina project as compared to the overall size of the 1,133,551 acre Ft. Rock management unit and the hiding cover acreage available on the Deschutes National Forest would be almost negligible regardless of the alternative selected for implementation. The Rim-Paunina project is consistent with the Deschutes Land and Resource Management Plan and mule deer viability would be maintained on the Deschutes National Forest.

***Elk*** – All action alternatives would result in a loss of hiding cover across subwatersheds and within the 660 foot distance banding zone adjacent to open roads and motorized trails. This would lead to an increase in elk vulnerability to legal and illegal hunting near these motorized routes. Increased visibility is also expected to result in the animals spending even more time moving to avoid human disturbance. Because this project does not impact key elk areas described in the Deschutes Land and Resource Management Plan, effects are expected to be minimal with a small negative trend but negligible at the forest level. The Rim-Paunina project is consistent with the Deschutes Land and Resource Management Plan, and elk viability would be maintained on the Deschutes National Forest.

# Old Growth Management

**Late and Old Structure (LOS) Connectivity Corridors**
**Existing Condition**
Late and old successional (LOS) habitat is an element of the "Interim Management Direction establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales in the Regional Forester's Eastside Amendment #2" (Screens). The entire Rim-Paunina planning area of 40,000 acres is within this "Interim Management Direction, Eastside Amendment #2" area. This amendment requires the identification of connectivity corridors designed to connect designated old growth areas and LOS habitat types across the landscape. These corridors are intended to allow movement and interaction of adults and dispersal of young of LOS or old growth associated species. Corridors do not necessarily meet the description of "suitable" habitat for breeding, but allow free movement between suitable breeding habitats. It is important to ensure that blocks of habitat maintain a high degree of connectivity between them and that blocks of habitat do not become fragmented in the short-term. Connectivity corridors are considered stands in which medium to larger trees are common, and canopy closure is within the top-third of site potential. Stand widths should be at least 400 feet at their narrowest point, unless it is impossible to meet the 400 foot with current vegetative conditions. If stands meeting these descriptions are not available, the next best available habitat would be identified.

Removal of trees within connectivity corridors is permitted if all the criteria in the above can be met and if understory is left in patches or scattered to assist in supporting stand density and cover. Understory removal, stocking control, and salvage are potential activities that can occur. In stands that do not currently meet LOS standards, non-regeneration or single tree selection activities should proceed only if the prescription moves the stand towards LOS conditions as soon as possible (USDA 1995).

Connectivity corridors have been identified and mapped for the Crescent Ranger District. The placement of the corridors reflects habitat conditions currently present considering past timber harvests including salvage operations from the mountain pine beetle epidemic of the 1980's. Medium and large size trees are present in most of the corridors although small diameter trees likely comprise the majority of the stems/acre. Most of the corridor acreage has multiple canopy layers regardless of the PAG the corridor is in. There are at least two connectivity corridors between allocated old growth areas.

### *Environmental Consequences*
**Alternatives A**
**Direct and Indirect Effects**
The selection of this alternative would result in no active management within the mapped corridors. The structural complexity and existing canopy cover within the corridors would remain unchanged, at least in the short-term. On many stands of drier ponderosa pine and lodgepole pine plant associations, stocking densities would remain above desired levels. Vegetation successional processes would continue to occur that may include an increased overstory canopy cover and tree height and the formation of multiple canopy layering favorable to some species. However, over the long-term this alternative may also increase the risk of overstocked stands becoming susceptible to large tree loss from disease, insects and fire events. Because implementation of this alternative would result in no impact to the existing condition, there are no direct, indirect, or cumulative effects.

**Effects Common to All Action Alternatives**
As shown in Table 15 (Connectivity Corridor Acres in Chapter 2, Mitigation Measures) all action alternatives have nearly identical corridor acreage proposed for thinning treatments. Alternative B would conduct thinning treatments on 300 acres, Alternatives C and D would have 280 acres of thinning, and

Alternative E would have 285 acres of thinning. The commercial and small diameter thinning planned would reduce overall canopy cover but would still remain within the top third of site potential depending on the plant association and site specific conditions. This would result in a more open condition favorable to some species that prefer less canopy, but would provide adequate cover and structure to facilitate travel by most species likely to utilize corridors. Thinning would promote the development of larger diameter trees by reducing stand density and competition for scarce resources and improve forest resilience where actively managed. Where thinning occurs within younger aged stands, thinning designed to promote the development of large tree would likely improve long-term habitat conditions within the corridors. Underburning in corridors of ponderosa pine would be limited to maintain the presence of multi-canopy layering and shrubs for small mammals, nesting songbirds, and browse for big game animals. The placement of wildlife retention areas (passive management) may result in fewer actual acres of the corridors being treated than the 280 to 300 acres predicted. Site specific wildlife retention areas would not be known until sale layout.

**Cumulative Effects Common to All Action Alternatives**

The effects of past timber harvest were considered when connectivity corridors were identified and mapped. The activities in Table 19 were reviewed for their potential for cumulative effects on connectivity corridors. None of the activities listed in the table would contribute to a cumulative effect because the projects have either already been completed or are not relevant due to spatial proximity of the project. Therefore, there are no cumulative effects expected with project implementation.

**Forest Fragmentation**

Li and Reynolds (1999) defined forest fragmentation as the processes of increasing the number of landscape pieces, decreasing interior habitat area, increasing the extent of forest-opening edges, or increasing isolation of residual forest patches. The primary force causing changes in the fragmentation patterns are human-caused disturbances (Butler et al. 2003). Since the late 1800's timber harvesting and fire suppression have replaced natural disturbances as the primary forces shaping forest landscapes (Rochelle 1999). In low-elevation forest land in western-Washington and Oregon, a significant proportion of the forest has been converted to other uses such as agriculture and suburban development, resulting in long-term or permanent habitat loss and forest fragmentation (Rochelle 1999). In November 1998, a scientific conference was held in Portland, Oregon entitled "Forest Fragmentation: Wildlife and Management Implications". The conference was convened to provide a synthesis of the current state of knowledge related to fragmentation in managed forests of the Pacific Northwest. Rochelle (1999) synthesized key points from the authors' papers and conference presentations. Some of the key findings from the conference included:

- Northwest forests were naturally fragmented by disturbances such as fire and disease; small patches dominated east-side forests; larger patches characterized west-side forests. In drier east-side forests fire suppression is, over-time, "de-fragmenting" patterns of fuel distribution and increasing the potential for large wildfires.
- Fragmentation usually co-occurs with habitat loss and the response of vertebrate populations differ, and for most species the effects of habitat loss are more significant than changes in habitat pattern.
- Both positive and negative effects of forest "edge" have been documented in recent research. Leaving relatively small amounts of habitat structure (e.g. shrubs, snags, decaying wood, live conifers, and hardwoods) after harvest, apparently, makes the areas (matrix) between habitat patches more hospitable, so that movement and dispersal of many species may be enhanced.
- In the east and midwest many studies document increased predation and parasitism near edges; in the Pacific Northwest researchers have found little effect of patch area or negative edge effects,

nor does there appear to be strong evidence of bird species requiring only forest interior habitat (Kremsater and Bunnell 1999; Bunnell et al. 1997 cited in Rochelle et al. 1999).

- In western forests there is little evidence of negative edge effects (Kremsater and Bunnell 1999 in Rochelle 1999) and reflects the fact that stands of different ages do not act as habitat islands, are not surrounded by agricultural habitat, and exist in a mosaic where edges are continually changing.

**Existing Condition**

The 40,000 acre Rim-Paunina project area could be described as a relatively contiguous forested block separated by Highways 97 and 58. Large lakes, reservoirs, or lava formations which can interrupt a connected forested landscape are not present in this planning area. There is a noticeable difference however, in forest types as a result of changes in physiography, geology, soil types, and aspect that affect which tree species are best suited to the growing conditions. Human-induced fragmentation has occurred through the design and placement of a forest road network and regeneration timber harvest program that began in the 1950s and ended in the early 1990s. Regeneration harvests in the planning area are most common west of Highway 97 in stands of beetle killed lodgepole pine. However, the only permanent loss of forest stands are those that were removed for permanent road access and approximately 106 acres of private land in the Two Rivers North housing subdivision in the watershed. The regeneration harvest blocks have been re-planted with trees and are currently 20-25 years old and over the next several decades would result in a much less fragmented (less edge) landscape as stands become mid-successional in age (greater than 40 years). During the interim, early-seral associated wildlife species benefit from a landscape that provides some of this habitat type.

Any future large-scale fragmentation would likely be the result of disturbance events such as wildfire or forest loss to insects or diseases. Small-scale fragmentation may occur from group selection cuts ranging from two to five acres in size. However, Kremsater and Bunnel (1999 cited by Rochelle et al. 1999) stated there is little available data on potential edge effects in the small openings created by partial cutting in the Pacific Northwest, or on edges between old growth and older second-growth stands. Neither of these effects is likely to be large because openings may be too small in the first instance and in both instances the structural contrasts are relatively small.

## *Environmental Consequences*

**Alternative A**

**Direct and Indirect Effects**

Implementation of this alternative would result in no immediate change from the current vegetative condition in the project area. The regenerated stands of forest would continue to grow resulting in less edge habitat in the planning area. This would benefit wildlife species generally associated with increasing levels of canopy cover and larger tree diameter by providing a more connected forest landscape. Those wildlife species more closely associated with early-seral forests would gradually decrease in population and distribution as these stands mature. Because there are no actions planned there would be no cumulative effects from this action.

**Effects Common to All Action Alternatives**

There is no permanent road construction planned with this analysis. However, to access treatment units, temporary roads would be constructed. Approximately 9.2 miles would be needed for Alternative B, 6.5 for Alternatives C and D, and 8.3 miles for Alternative E. This would equal approximately 17 acres converted to temporary road for Alternative B, 12 acres for Alternatives C and D, and 16 acres for Alternative E. Temporary roads are generally less than 16 feet in width and would be subsoiled after the completion of all post-sale activities, usually within five years (or less) of the initial activity. Natural re-vegetation of subsoiled roads would occur as shrubs and tree species begin seeding in. On the Crescent Ranger District, due to available seed source, vegetative recovery on subsoiled roads is usually

established within five years [22]. Temporary road construction has effects that have been disclosed for other resources in this analysis (reference the sections titled "Soils", "Big Game", "Cultural Resources," and "Irreversible and Irretrievable Commitment of Resources" in Chapter 3 of this EIS). Due to the temporary nature of the effects (less than five years) and the limited short-term access, this activity would not be considered to change the existing continuity of the forest or result in any long-term edge habitat throughout the 40,000 acre planning area. Also, the potential for introduction of invasive plants associated with temporary road construction is discussed in the section titled "Invasive Plants" in Chapter 3 of this EIS. Activities proposed would not create additional habitat fragmentation to mid- or late-seral forested stands in the project area.

**Alternatives B and C**
**Direct and Indirect Effects**
Both alternatives propose a mix of commercial thinning, improvement cuts, small diameter thinning, and the use of prescribed underburns to improve tree growth and enhance forest health. Large scale openings capable of creating fragmentation would not occur in either alternative. There would also be no conversion of forested lands to other uses such as commercial development. Therefore, no direct or indirect effects are anticipated to occur.

**Alternatives D**
**Direct and Indirect Effects**
This alternative proposes a group selection cutting method to eliminate the presence of mistletoe through the creation of openings on approximately 778 acres of the most severely infected stands. Openings would range from 2-5 acres in size and essentially all trees would be removed including those over 21 inches in diameter. The most severely infected stands are located in ponderosa pine primarily in the northern portion of the planning area and south of the Gilchrist State Forest. Within an individual stand, several openings of 2-5 acres could be created totaling 15-30 percent of the total stand areas to prevent re-infection of dwarf mistletoe from above. Ponderosa pine and sugar pine seedlings would be planted in the group selection cuts to facilitate future replacement of the stand. The remainder of the timber harvest proposed in Alternative D would have a commercial thinning or an improvement cut prescription applied generally removing infected trees and/or understory trees to increase residual tree vigor and forest health.

The approximately 778 acres of openings 2-5 acres in size would be interspersed among other treatment units where commercial thinning and/or prescribed underburning would occur. While this action would create small unit edge habitat, this effect would last for approximately thirty years or until the replanted trees have grown and the treatment units no longer appear as a small opening. As previously mentioned, Kremsater and Bunnell (1999) have found there is little evidence of negative edge effects in western forests. They concluded that stands of different ages do not act as habitat islands, are not surrounded by agricultural habitat and exist in a mosaic where edges are continually changing. Agee (1999 cited in Rochelle et al. 1999) stated that most forest restoration strategies are specifically designed to fragment the continuous fuel across the interior West landscapes. Fragmentation in this context discussed by Agee does not necessarily affect interior habitat area or create edge effect. The benefit of conducting the group selection treatments is having mistletoe free trees developing into future late and old structure as opposed to trees experiencing reduced growth and continuously raining down mistletoe onto understory trees.

**Alternative E**
**Direct and Indirect Effects**
Alternative E also proposes a mistletoe reduction strategy, focusing on the most severely infected stands. However, the difference from Alternative D is that only trees under 21 inches would be removed and infected trees over 21 inches diameter would be converted to snags through underburning, tree topping, or

[22] Ken Kittrell, Transportation Manager for the Crescent Ranger District, June, 2006.

blasting the infected portion of the tree. The size of openings for mistletoe control would not be limited to two to five acres as in Alternative D. This has the potential to create larger openings as a long-term aid to control mistletoe and develop future old growth ponderosa pine not impacted by mistletoe. Planting of ponderosa pine and/or sugar pine seedlings would occur within the openings with small diameter thinning expected in approximately twenty to thirty years to control stocking. Alternative E has the potential to create larger openings than Alternative D although this effect would only last several decades until the growth of the planted tree seedlings diminishes the look of an opening. The provision for providing well distributed big game hiding cover would also tend to restrict the size of openings.

Similar to Alternatives B, C, and D, there is no conversion of forest lands to other uses such as commercial development. The benefit of this alternative is in having larger areas able to develop into late and old structure ponderosa pine and sugar pine less likely to be impacted by mistletoe as opposed to trees experiencing reduced growth and having mistletoe continually infecting the understory trees that may never develop into old growth.

**Cumulative Effects Common to All Action Alternatives**

The activities in Table 19 were reviewed for their potential for cumulative effects on forest fragmentation. The zone of influence was defined as the 40,000 acre Rim-Paunina project area. There are no projects that have a similar zone of influence that overlap in time and space therefore, additive cumulative effects are not anticipated. There are approximately 106 acres of private lands in the planning area within the Two Rivers North rural housing subdivision. Because of roads and housing development that has already occurred these lands are considered fragmented and would remain that way for the foreseeable future.

## Old Growth Management Areas

The Deschutes Land and Resource Management Plan (LRMP) designated Old Growth Management Areas (OGMA) in order to provide stands of old-growth trees to preserve natural genetic pools, provide habitat for plants and wildlife species associated with over-mature tree stands, contribute to the diversity spectrum, and provide aesthetic appeal (LRMP p.4-2). The distribution and minimum size of old growth areas were based upon the habitat requirements of three indicator species: pine martens in the mixed conifer forest, goshawk in the ponderosa pine forest, and three-toed woodpecker in the lodgepole pine forest.

Key standards for this project from the amended LRMP include the following:

***Timber***

"M15-4 There will be no programmed harvest or wood removal in these areas during this planning period, however, vegetation manipulation including removal may occur to perpetuate or enhance old growth characteristics." (LRMP 4-150).

"M15-6 Firewood cutting and gathering is not permitted" (LRMP 4-150).

**Analysis Methods, Units of Measure and Assumptions**

This section focuses on focal species habitat within the OGMAs, as well as the diversity of other species dependent on late and old structure that may be affected by silvicultural and fuels reduction treatments. Habitat for the focal species is not limited to the OGMA but provided throughout the project area.

**Analysis Measures**

***Habitat for Focal Species*** – To measure existing condition and the change from each action alternative, the amount of currently available nesting or denning habitat is described for each OGMA and how much would be altered under each alternative. The focal species in OGMAs were selected because they are endemic and their habitat requirements are thought to be similar or exceed other species dependent on late and old forest structure (LRMP 4-149). Table 73 is also provided that shows total acres of treatments by

type, OGMA, and by alternative regardless of whether the acreage is currently functioning as denning or nesting habitat for the focal species.

**Existing Condition**

There are five designated Old Growth Management Areas (OGMAs) that are entirely or partially within the project area and are described below.

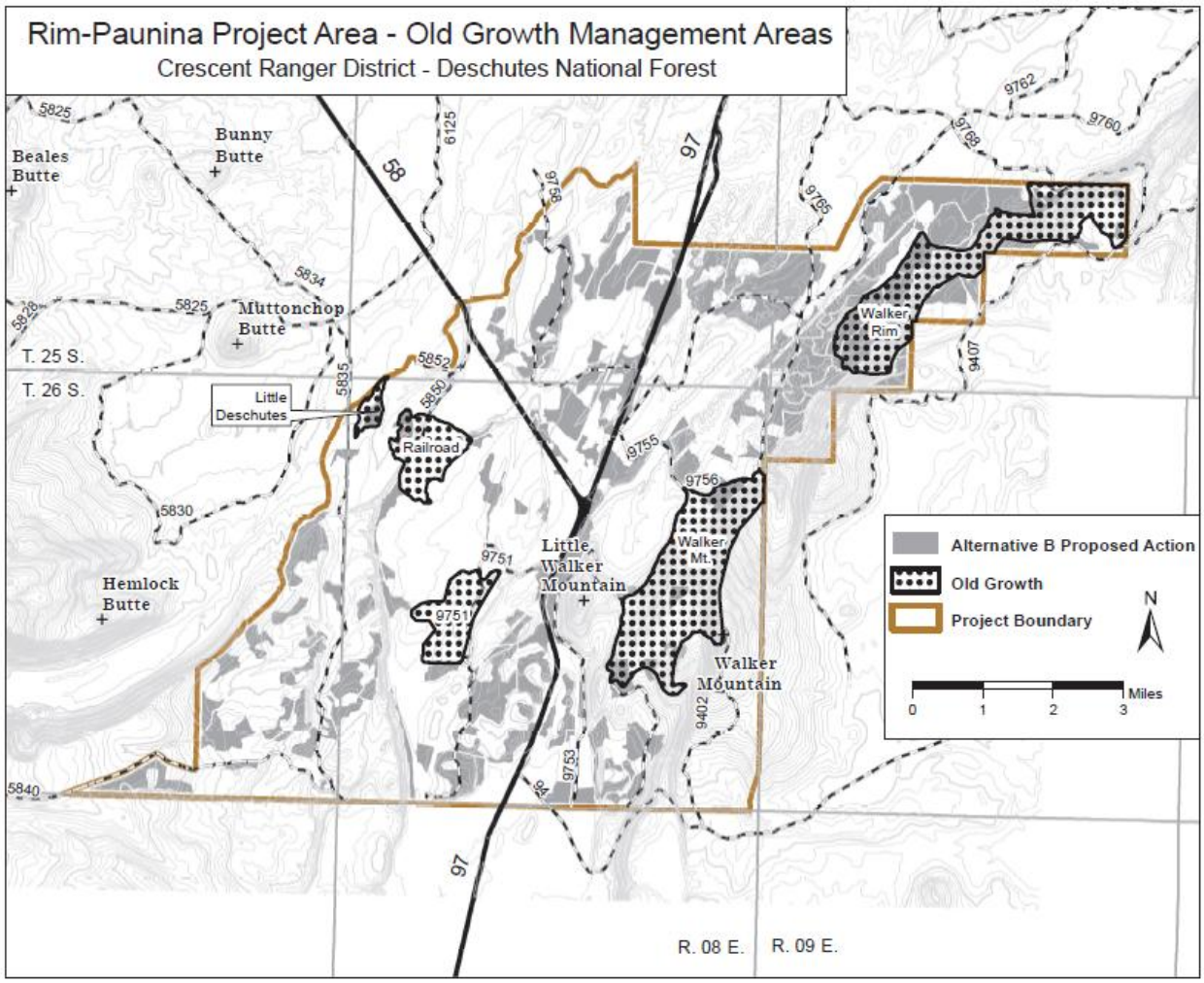



**Figure 19. Location of the Five Old Growth Management Areas in the Rim-Paunina Project Area**

***Little Deschutes River OGMA (id #570 and #575)*** is 257 acres located east of the Two Rivers North community and near the Little Deschutes River. This OGMA is bisected by a narrow strip of private railroad land with two sets of railroad tracks bisecting id #570 to the north and #575 to the south. Both are described as one OGMA. This OGMA is primarily (93 percent) ponderosa pine with minor components of riparian and lodgepole pine. The focal species for this OGMA is goshawk. There are no recorded observations in the vicinity. Approximately 60 acres of the OGMA are classified as goshawk nesting habitat.

***Railroad OGMA (id#579)*** is 540 acres located approximately one mile southeast of the Little Deschutes OGMA. Railroad OGMA has both railroad and utility corridor lines running through it. This OGMA is 73 percent lodgepole pine with a component of ponderosa pine. The three-toed woodpecker is the focal

species, although there are no documented sightings in the area. Approximately 367 acres of the OGMA were classified as currently providing three-toed woodpecker nesting habitat.

***9751 OGMA (id#586)*** is 525 acres located in the southern portion of the project area, west of Highway 97 along the 9751 road. This OGMA is 70 percent ponderosa pine with stands of lodgepole pine mixed in. The focal species are goshawk and three-toed woodpeckers. There are no documented sightings of either species within or adjacent to this area. Currently, approximately 244 acres of goshawk habitat and 150 acres of three-toed woodpecker habitat are defined as nesting capable within this OGMA.

***Walker Mountain OGMA (id#581)*** is the largest OGMA within the project area. It is 1,936 acres located east of Highway 97 on the southern portion of Walker Mountain. It is predominately (78 percent) a mixed conifer dry plant association. The lower slopes are ponderosa pine that transitions to mixed conifer consisting of ponderosa pine, Douglas-fir, and sugar pine. The focal species for this OGMA are the goshawk, marten, and three-toed woodpecker because habitat is available and suitable for all three species. Marten are documented in and around the area but goshawks and three-toed/black-backed woodpeckers are not. Approximately1,692 acres of the OGMA are considered three-toed woodpecker habitat, 757 acres meet the goshawk nesting habitat definition, and 310 acres provide marten denning habitat.

***Walker Rim OGMA (id#561)*** is 1,931 acres located in the northeastern portion of the planning area on the rim and north of the Walker Mountain OGMA. The habitat is nearly split with 50 percent in ponderosa pine and 44 percent in mixed conifer and with the remaining six percent in lodgepole pine. The focal species are goshawk, marten, and three-toed woodpecker. There are documented goshawk observations in and around the area but no known nests. There are no documented marten or three-toed woodpecker sightings in the OGMA. There are approximately 1,111 acres of goshawk nesting habitat, 996 acres of three-toed woodpecker habitat, and 517 acres of marten denning habitat in the OGMA.

**Direct and Indirect Effects**
**Alternative A**
Implementation of this alternative would result in no immediate vegetative change within any of the five designated Old Growth Management Areas (OGMAs) within the project. Habitat capability would be maintained for the designated species although overstocked stands would continue to be at risk of large tree loss from disease, insects, and uncharacteristic fire events. For more information, reference sections titled “Fire and Fuels” and “Forested Vegetation” in Chapter 3 of this EIS.

**Effects Common to All Action Alternatives**
All five OGMAs are located outside the range of the Northwest Forest Plan but within lands managed with *Interim East-Side Screen* direction. Active vegetative management is proposed in each OGMA for each action alternative. Commercial sized tree removal prescriptions include a standard thin from below, a stand improvement cut removing diseased trees or those unlikely to respond to thinning, group selection cuts removing all or most trees in two to five acre gaps, and/or alternative mistletoe treatments to remove diseased trees. Post-sale these areas would also experience small diameter thinning and/or underburning as needed. “Fuels only” treatments are also prescribed that would involve thinning small (<8 inch diameter) trees, pruning to reduce susceptibility to wildfire, and prescribed underburning in ponderosa pine stands for a return to a historical regime. The amount of OGMA acres treated by alternative is displayed in Table 73.

The commercial thinning activities would reduce canopy cover and tree densities on affected units and may not provide habitat needs for all life conditions for the species listed above. For example, canopy cover may be reduced below levels typically used for nesting or denning but would still provide habitat for some life functions such as foraging or dispersal.

Additional effects analysis based on the entire project area is provided for the northern goshawk, American marten and three-toed and black-backed woodpeckers in the Management Indicator Species section of this document.

**Table 73. Acres of Treatment Occurring within each OGMA by Alternative**

| OGMA | Focal Species | OGMA Acres Treated Alternative B | OGMA Acres Treated Alternative C | OGMA Acres Treated Alternative D | OGMA Acres Treated Alternative E |
|---|---|---|---|---|---|
| Little Deschutes 257 acres | Goshawk | 57 HTH | 57 HTH | 57 HTH | 57 HTH |
| | | | | | |
| Railroad 540 acres | 3-toed woodpecker | 67 HTH<br>5 HIM<br>72 total | 67 HTH<br>4 HIM<br>21 Fuels<br>92 total | 67 HTH<br>4 HIM<br>21 Fuels<br>92 total | 67 HTH<br>4 HIM<br>21 Fuels<br>92 total |
| | | | | | |
| 9751 525 acres | Goshawk<br>3-toed woodpecker | 3 HTH | 36 Fuels | 36 Fuels | 36 Fuels |
| | | | | | |
| Walker Mountain 1,936 acres | Goshawk<br>Marten<br>3-toed woodpecker | 231 HTH | 189 HTH<br>1,079 Fuels<br>1,268 total | 97 HTH<br>92 HSG<br>1,079 Fuels<br>1,268 total | 138 HTH<br>92 ALTMIST<br>1,079 Fuels<br>1,309 total |
| | | | | | |
| Walker Rim 1,931 acres | Goshawk<br>Marten<br>3-toed woodpecker | 488 HIM<br>39 Aspen<br>255 HTH<br>782 total | 255 HTH<br>17 HIM<br>39 Aspen<br>387 Fuels<br>698 total | 68 HTH<br>17 HIM<br>187 HSG<br>39 Aspen<br>387 Fuels<br>698 total | 68 HTH<br>488 HIM<br>188 ALTMIST<br>39 Aspen<br>387 Fuels<br>1,170 total |
| Grand Total OGMA Treatments | | 1,145 | 2,151 | 2,151 | 2,664 |

HTH = commercial thinning, HIM = improvement cuts, Aspen = aspen treatment, HSG = group selection ALT MIST = Alternative Mistletoe treatment (see Ch.3 (Forested Vegetation) for more information on prescriptions). Fuels = small diameter thinning, pruning, and/or prescribed underburning.

## Alternative B
## Direct and Indirect Effects

### *Little Deschutes OGMA*
***Goshawk***

A total of 57 acres would have commercial treatment followed by prescribed underburning. Post-harvest canopy cover would likely range from 30-35 percent and below the minimum 40 percent level the Crescent Ranger District uses to define goshawk nesting habitat. However, the remaining 200 acres of the OGMA would stay in a passive management strategy capable of providing nesting acreage for a pair of goshawks. The 57 acres of thinned stands may function as goshawk foraging habitat but may also re-develop into nesting suitability within one to two decades with canopy cover increasing approximately five percent per decade.

***Railroad OGMA***
***Three-toed Woodpecker***
A total of 72 acres of the OGMA would have commercial treatment applied. It is estimated that post-harvest canopy cover in this lodgepole pine dominated area would range from 20-25 percent but be within the range of mature lodgepole pine stands used by nesting three-toed woodpeckers described by Goggans et al. (1989). The 72 acres thinned would reduce the risk of this acreage becoming susceptible to mountain pine beetle attacks and may retain the larger tree component longer than in unthinned stands. However, Goggans et al. (1989) also concluded that three-toed woodpecker are less likely to use logged stands as nesting habitat as compared to unlogged sites. They also determined that three-toed woodpecker foraging occurred most often in uncut stands with canopy cover less than 60 percent and the species selected against multi-story stands for foraging and roosting. The Goggans study took place on the Deschutes National Forest including sites on the Crescent District. Because approximately 468 acres would remain untreated (passive management), these more densely stocked acres would continue to provide nesting, foraging, and roosting habitat.

***9751 OGMA***
***Goshawk and Three-toed Woodpecker***
Alternative B proposes the commercial treatment of three acres of the 525 acre 9751 OGMA. Because this OGMA contains lodgepole pine and ponderosa pine, the goshawk and three-toed woodpeckers are both focal species. The three acres planned for treatment would have negligible impacts to either species and the OGMA would continue to provide nesting, foraging and roosting habitat for both species.

***Walker Mountain OGMA***
***Goshawk***
As previously mentioned, the majority of the OGMA is within the mixed conifer plant association with the marten being the focal species for mixed conifer forest. However, the 231 acres of commercial treatment planned with post-sale activities of small diameter thinning, shrub mowing and/or underburning would occur in the ponderosa pine portion of the OGMA with the goshawk as the focal species. None of the 231 acres meet the goshawk nesting definition, consequently, post-treatment, these acres could still function as foraging habitat. Over time, an increase in residual tree diameter and canopy could move these stands towards suitability as nesting habitat. Therefore, there would be no impact to goshawk habitat.

***Three-toed Woodpecker***
Because much of the ponderosa pine stands also have an understory component of lodgepole pine, it would provide habitat for the three-toed woodpecker. The commercial treatment would remove most of the lodgepole pine understory in preparation of returning prescribed fire in the treatment units. The 231 acres affected however is relatively minimal compared to the estimated 1,692 acres currently defined as three-toed woodpecker nesting habitat in the OGMA. Therefore, three-toed woodpecker habitat would still be available in the OGMA.

***Marten***
The 310 acres of marten denning habitat in this OGMA would not be affected by any project activities in Alternative B.

***Walker Rim OGMA***
***Goshawk***
A total of 782 acres of commercial treatments would occur in Alternative B. Approximately 1,111 acres of the OGMA currently provide goshawk nesting habitat with the majority of this acreage in mixed conifer stands on the steeper portions of Walker Rim. The commercial treatments (thinning,

improvement cuts, and aspen enhancement) would generally occur in stands not currently defined as nesting habitat due to less than 40 percent canopy cover defined as nesting and/or tree diameters not large enough for nesting. Portions of several units including 630, 690, and 2010 have mapped nesting habitat but would not be defined as nesting habitat after the completion of timber harvest, small diameter thinning, and/or prescribed underburning operations. Post-treatment canopy cover would be below the 40 percent but could develop into nesting habitat again in several decades. Mitigation measures for the retention of 15-25 percent of each treatment unit may also provide blocks of nesting habitat left in a passive management scenario for a pair of goshawks. Therefore, effects to goshawks utilizing this OGMA are expected to be minimal.

***Marten***

There are 517 acres of mapped marten denning habitat in this OGMA, approximately 20 acres of which overlap unit 621. Unit 621 (39 acres in the OGMA, and 20 acres in marten denning habitat) is an aspen enhancement unit designed to remove conifers less than 21 inches diameter in five small openings up to two acres each to reduce competition to the existing aspen trees. Two, 2-acre openings would be created in marten denning habitat, with the remaining 16 acres having understory thinning. The small openings would not function as denning habitat though the commercial thinning portion would have canopy at the 30-35 percent range used to define denning habitat based on Raphael and Jones marten study on the adjacent Winema National Forest (1997). There would be a reduction in stand diversity with less canopy layering, though snags and down wood would not be reduced. Post-harvest this unit should still maintain its capability to support a denning female marten.

Raphael and Jones (1997) conducted a study of marten on the adjacent Winema National Forest and estimated male marten home ranges at 4,272 acres and 1,392 acres for females. Based on these estimates, the Walker Rim OGMA by itself is not large enough to support one male marten home range but may support several female home ranges that have overlap with the OGMA. The four acres of openings would not be expected to appreciably change marten use in this OGMA.

***Three-toed Woodpecker***

There are 996 acres of three-toed woodpecker nesting habitat in this OGMA. Approximately 34 acres of commercial thinning and four acres of small openings (in Unit 621) would be completed in nesting habitat in Alternative B. The thinning would remove trees less than 21 inches in diameter including lodgepole pine in the 7-17 inch range that Goggans et al. (1989) determined were preferentially used for nesting. Post-harvest canopy cover in the thinned units would range from 20-30 percent and within the mean of 27 percent for nest sites determined by Goggans et al. (1989). The four acres of openings would not meet this post-harvest canopy cover level. However, Goggans et al. (1989) also concluded three-toed woodpecker are less likely to use logged stands as nesting habitat as compared to unlogged sites. They also concluded that male three-toed woodpecker home range size ranged from 131 to 751 acres and was not related to the amount of unlogged areas or the amount of mature and immature forest present. Because approximately 958 of the 996 acres of current nesting habitat would remain untreated (passive management) these more densely stocked acres would continue to provide nesting, foraging, and roosting habitat. There should be no reduction in the number of nesting pairs of three-toed woodpeckers utilizing the Walker Mountain OGMA based on the Goggans et al. (1989) study.

**Alternative C**
**Direct and Indirect Effects**

***Little Deschutes OGMA***
***Goshawk***

Because Alternative C proposes the same units with the same prescriptions as Alternative B, the effects would be similar. Post-harvest canopy cover would likely range from 30-35 percent and below the

minimum 40 percent level the Crescent Ranger district uses to define goshawk nesting habitat. However, the remaining 200 acres of the OGMA would stay in a passive management strategy capable of providing nesting acreage for a pair of goshawk. The 57 acres of thinned stands may function as goshawk foraging habitat but may also re-develop into nesting suitability within several decades as canopy cover of the residual trees increases in response to less tree competition.

***Railroad OGMA***
***Three-toed Woodpecker***
Alternative C proposes nearly the same treatments units and prescriptions as Alternative B with the same effects, but also includes an additional 21 acres of fuels only treatments. The 21 acres includes mowing of bitterbrush and application of prescribed burning in a ponderosa pine portion of the OGMA. The burning may result in the mortality of a few understory lodgepole and/or ponderosa trees but would not appreciably change the character of this portion of the OGMA. Its ability to provide nesting, roosting, and foraging habitat for the three-toed woodpecker would be maintained with a small acreage benefit of reducing risk of large tree loss from competition, uncharacteristic fire, or beetle attacks.

***9751 OGMA***
***Goshawk and Three-toed Woodpecker***
Alternative C proposes 36 acres of fuels treatments of bitterbrush mowing followed by prescribed underburning in the ponderosa pine portion of the OGMA (eastern boundary). While the burning may result in the loss of a few, small diameter ponderosa or lodgepole pine, the overstory that provides the high canopy cover would be retained. Therefore, there would be no impact to goshawk nesting habitat nor would there be any impact to three-toed woodpeckers which are associated with large diameter lodgepole pine for nesting, roosting, and foraging.

***Walker Mountain OGMA***
***Goshawk***
Implementation of Alternative C would result in 189 acres of commercial treatment and 1,079 acres of fuels treatments utilizing small diameter thinning, shrub mowing and/or prescribed underburning. None of the commercial treatments would occur within stands currently functioning as goshawk nesting habitat though they would have the capability to become nesting habitat in the future with increased diameter growth and canopy cover. The small diameter thinning (<8 inches diameter) would not negatively affect nesting habitat because the large and dominant overstory trees provide the greatest contribution toward canopy cover. The mowing and/or underburning in the ponderosa pine stands would have no impact on goshawk nesting habitat. As of January 2012 goshawks have not been documented in this OGMA.

***Marten***
A total of 148 of the 189 acres of commercial treatments planned are within ponderosa pine dominated stands that do not meet the definition of marten denning habitat. Unit 975 (41 acres) is mapped as denning habitat and the commercial treatment would likely reduce the canopy cover in the range of 30-35 percent defined as denning habitat based on a Raphael and Jones marten study (1997). There would be a reduction in stand diversity with less canopy layering, though snags and down wood would not be reduced. Post-harvest this unit should still maintain its capability to support a denning female marten.

Approximately 200 acres of fuels treatments mid-slope on the OGMA would occur within mapped marten denning habitat. Activities planned include small diameter thinning (<8 inches diameter) and brush mowing or prescribed burning. The small trees being removed are not large enough to act as a den site, though they do contribute to stand structural diversity and provide additional protection from avian predation. The mowing and/or burning have the capability to reduce small mammal habitat (snowshoe hares, squirrels, chipmunks) that provide a prey base for marten.

Raphael and Jones (1997) conducted a study of marten on the adjacent Winema National Forest and estimated male marten home ranges at 4,272 acres and 1,392 acres for females. Based on these estimates, the Walker Mountain OGMA by itself is not large enough to support one male marten home range but may support several female home ranges that are within or overlap the OGMA. The 200 acres of fuels treatments would reduce prey availability for martens but would be partially mitigated with the retention of no treatment blocks averaging 15 percent in each unit. These would continue to function as foraging areas for marten and denning habitat would still be available to support individual animals.

***Three-toed Woodpecker***

The 189 acres of planned commercial treatment is in an area dominated by ponderosa pine but has an understory component of lodgepole pine. Goggans et al. (1989) study of black-backed and three-toed woodpeckers on the Deschutes National Forest showed three-toed woodpeckers nested exclusively in lodgepole pine with heartrot. They also determined that home range size of three male three-toed woodpeckers ranged from 131 to 751 acres and was not related to the amount of unlogged areas or the amount of mature and immature forest present.

The commercial treatment would remove lodgepole pine that is potentially large enough diameter (7-17 inches) described by Goggans et al. (1989) as used for nesting. Mitigation measures for 15-25 percent no harvest retention areas in each treatment would maintain some lodgepole pine presence and be available for nesting purposes. The 1,079 acres of fuels only treatments would focus on small diameter thinning of green trees less than eight inches in diameter which is at the lower diameter range described by Goggans et al. (1989) used by three-toed woodpeckers for nesting. Therefore, the fuels treatments would only have a minimal impact on three-toed woodpeckers because the majority of the potential nest-sized lodgepole pine trees would be retained. There should be no reduction in the number of nesting pairs of three-toed woodpeckers utilizing the Walker Mountain OGMA based on the 1989 Goggans et al. study.

***Walker Rim OGMA***

***Goshawk***

A total of 698 acres of activities would occur in Alternative C in the Walker Rim OGMA including 311 acres of commercial treatment and 387 acres of fuels only work. Of this amount, Alternative C would implement approximately 105 acres of commercial treatment with post-sale activities of small diameter thinning and brush mowing and/or underburning within mapped goshawk nesting habitat. There would also be approximately 195 acres of ‘fuels only’ treatments within the 1,111 acres of mapped goshawk nesting habitat in this OGMA. Based on past timber harvests in ponderosa pine plant association with similar prescriptions, post-harvest canopy cover would likely range form 30-35 percent and below the 40 percent canopy level used to define nesting stands. However, this effect would be temporary and thinned stands could return to the 40 percent level in several decades due to increased canopy cover development. The ‘fuels only’ units would focus on removing trees less than eight inches in diameter that do not substantially contribute to overstory canopy cover percentages. Therefore, fuels treatments would have no impact on goshawk nesting stands. Consequently, approximately 255 acres of the 1,111 acres of goshawk nesting habitat in the OGMA would be impacted by harvest activities with the capability of returning to nesting conditions in several decades. The remaining 856 acres of passively managed nesting habitat would continue to provide well connected stands on Walker Rim available for nesting goshawks.

***Marten***

A total of 698 acres of activities would occur in Alternative C in the Walker Rim OGMA including 311 acres of commercial treatment (thinning, improvement cuts, and aspen enhancement) and 387 acres of ‘fuels only’ treatments. Of this amount, approximately 20 acres of commercial treatment and 143 acres of ‘fuels only’ treatments would occur within the 517 acres of mapped marten denning habitat. Unit 621 (39 acres in the OGMA, and 20 acres in marten denning habitat) is an aspen enhancement unit designed to remove conifers less than 21 inches diameter in five small openings up to two acres each to reduce

competition to the existing aspen trees. Two, 2-acre openings would be created in marten denning habitat, with the remaining 16 acres having understory thinning. The small openings would not function as denning habitat though the commercial thinning portion would have canopy reduced to about 30-35 percent, what was defined as marten denning habitat based on the Raphael and Jones marten study on the adjacent Winema National Forest (1997). There would be a reduction in stand diversity with less canopy layering, though snags and down wood would not be reduced. Post-harvest the thinned acreage of this unit should still maintain its capability to support a denning female marten.

Approximately 153 acres of fuels treatments would occur on the lower slopes of the OGMA within mapped marten denning habitat. Activities planned include small diameter thinning (<8 inches diameter) and brush mowing or prescribed burning. The small trees being removed are not large enough to act as a den site though they do contribute to stand structural diversity and provide additional protection from avian predation. The mowing and/or burning have the capability to reduce small mammal habitat (snowshoe hares, squirrels, chipmunks) that provide a prey base for marten.

Raphael and Jones (1997) conducted a study of marten on the adjacent Winema National Forest and estimated male marten home ranges at 4,272 acres and 1,392 acres for females. Based on these estimates, the Walker Rim OGMA by itself is not large enough to support one male marten home range but may support several female home ranges that overlap the OGMA and adjoining National Forest lands. The 153 acres of fuels treatments would reduce prey availability for martens but would be partially mitigated with the retention of no treatment blocks averaging 15 percent in each unit. These blocks would continue to function as foraging areas for marten and denning habitat would still be available to support individual animals.

***Three-toed Woodpecker***

A total of 698 acres of activities would occur in Alternative C in the Walker Rim OGMA including 311 acres of commercial treatment (thinning, improvement cuts, and aspen enhancement) and 387 acres of fuels only treatments. Of this amount approximately 40 acres of commercial treatment and 163 acres of fuels only treatments would occur within the 996 acres of mapped three-toed woodpecker nesting habitat in this OGMA. The 40 acres of commercial treatment would occur in mixed conifer forest dominated by ponderosa pine, white fir, Douglas-fir, and a few aspen trees in unit 621 with an understory component of lodgepole pine, Douglas-fir, and white fir. Goggans et al. (1989) study of black-backed and three-toed woodpeckers on the Deschutes National Forest showed three-toed woodpeckers nested exclusively in lodgepole pine with heartrot. They also determined that home range size of three male three-toed woodpeckers ranged from 131 to 751 acres and was not related to the amount of unlogged areas or the amount of mature and immature forest present.

The commercial treatment would remove lodgepole that is potentially large enough diameter (7-17 inches) described by Goggans et al. (1989) used for nesting. Mitigation measures for 15-25 percent no harvest retention areas in each treatment would maintain some lodgepole pine presence and be available for nesting purposes. The 163 acres of fuels only treatments would focus on small diameter thinning of green trees less than eight inches in diameter which is at the lower diameter range described by Goggans et al. (1989) used by three-toed woodpeckers for nesting. Therefore, the fuels treatments would only have a minimal impact on three-toed woodpeckers because the majority of the potential nest-sized lodgepole pine trees would be retained. There should be no reduction in the number of nesting pairs of three-toed woodpeckers utilizing the Walker Rim OGMA based on the 1989 Goggans et al. study.

**Alternative D**
**Direct and Indirect Effects**

***Little Deschutes OGMA***
***Goshawk***
Because Alternative D proposes the same units with the same prescriptions as Alternatives B and C the effects would be similar. Post-harvest canopy cover would likely range from 30-35 percent and below the minimum 40 percent level the Crescent Ranger District uses to define goshawk nesting habitat. However, the remaining 200 acres would stay in a passive management strategy capable of providing nesting acreage for a pair of goshawks. The 57 acres of thinned stands may function as goshawk foraging habitat but may also re-develop into nesting suitability within several decades with canopy cover increasing approximately five percent per decade.

***Railroad OGMA***
***Three-toed Woodpecker***
Alternative D proposes the same 71 acres of commercial treatment with the same effects described for Alternative C. It also has the same 21 acres of fuels treatments described for Alternative C with similar effects. The commercial treatment would reduce the risk of large tree loss to density competition, beetle attacks, and/or uncharacteristic wildfire. The 21 acres of bitterbrush mowing and prescribed fire would take place in a small stand dominated by ponderosa pine. The burning may result in the mortality of a few understory lodgepole and/or ponderosa trees but would not appreciably change the character of this portion of the OGMA. Its ability to provide nesting, roosting, and foraging habitat for the three-toed woodpecker would be maintained.

***9751 OGMA***
***Goshawk and Three-toed Woodpecker:***
Because Alternative D proposes the treatment units and prescriptions as Alternative C the effects would be the same as Alternative C. The fuels treatments would not result in any loss of goshawk nesting habitat nor any loss of three-toed woodpecker nesting, foraging, or roosting habitat.

***Walker Mountain OGMA***
***Goshawk***
Because Alternative D proposes the same treatment units as Alternative C, the effects would be similar to Alternative C. Implementation of Alternative D would result in 189 acres of commercial treatment and 1,079 acres of fuels treatments utilizing small diameter thinning, shrub mowing and/or prescribed underburning. None of the commercial treatment would occur within stands currently functioning as goshawk nesting habitat. The only difference between Alternatives C and D is that in D approximately 28 acres of two to five acre gaps would be created in unit 895 as a mistletoe control method. All trees would be removed in these gaps and then replanted with disease free seedlings to develop into mistletoe free late and old structure forest. Unit 895 does not currently meet the definition of goshawk nesting habitat though the portion treated as a stand understory thin (approximately 64 acres) would have the potential to develop into goshawk nesting habitat as the ponderosa pine increases in diameter. The fuels treatments of small diameter thinning (<8 inches diameter) would not negatively affect nesting habitat because the large and dominant overstory trees provide the greatest contribution toward canopy cover. The mowing and/or underburning in the ponderosa pine stands would have no impact on goshawk nesting habitat.

***Marten***
Because Alternative D proposes the same treatment units as Alternative C, the effects would be similar to that described for Alternative C. A total of 148 of the 189 acres of commercial treatments planned are within ponderosa pine dominated stands that do not meet the definition of marten denning habitat. Unit 975 (41 acres) is mapped as denning habitat and the commercial treatment would likely reduce the canopy

cover in the range of 30-35 percent defined as denning habitat based on Raphael and Jones marten study (1997). There would be a reduction in stand diversity with less canopy layering, though snags and down wood would not be reduced. Post-harvest this unit should still maintain its capability to support a denning female marten.

The only difference between Alternatives C and D is that in D approximately 28 acres of two to five acre gaps would be created in unit 895 as a mistletoe control method. All trees would be removed in the gaps and then replanted with disease free seedlings to develop into mistletoe free late and old structure forest. Unit 895 does not meet the definition of marten denning habitat and the thinning and small gap creation would have no effect on marten.

Approximately 200 of the 1,079 acres of fuels treatments would be located mid-slope on the OGMA and within mapped marten denning habitat. Activities proposed include small diameter thinning (<8 inches diameter) and brush mowing or prescribed burning. The small trees that would be removed are not large enough to act as a den site though they do contribute to stand structural diversity and provide additional protection from avian predation. The mowing and/or burning would have the capability to reduce small mammal habitat (snowshoe hares, squirrels, chipmunks) that provide a prey base for marten.

Raphael and Jones (1997) conducted a study of marten on the adjacent Winema National Forest and estimated male marten home ranges at 4,272 acres and 1,392 acres for females. Based on these estimates, the Walker Mountain OGMA by itself is not large enough to support one male marten home range but may support several female home ranges that overlap the OGMA and adjoining National Forest lands. The 200 acres of fuels treatments would reduce prey availability for martens but would be partially mitigated with the retention of no treatment blocks averaging 15 percent in each unit. These would continue to function as foraging areas for marten and denning habitat would still be available to support individual animals.

***Three-toed Woodpecker***

Because Alternative D proposes the same treatment units as Alternative C, the effects would be similar to that described for Alternative C. The 189 acres of planned commercial treatment is dominated by ponderosa pine but has an understory component of lodgepole pine of varying sizes. The only difference between Alternatives C and D is that in D approximately 28 acres of two to five acre gaps would be created in unit 895 as a mistletoe control method. All trees would be removed in the gaps and then replanted with disease free seedlings to develop into mistletoe free late and old structure forest. Unit 895 does not meet the definition of three-toed woodpecker nesting habitat and the small gap creation would have no effect on this woodpecker species. A Goggans et al. (1989) study of black-backed and three-toed woodpeckers on the Deschutes National Forest showed three-toed woodpeckers nested exclusively in lodgepole pine with heartrot. They also determined that home range size of three male three-toed woodpeckers ranged from 131 to 751 acres and was not related to the amount of unlogged areas or the amount of mature and immature forest present.

The commercial treatment would remove lodgepole that is potentially large enough diameter (7-17 inches) described by Goggans et al. (1989) used for nesting. Mitigation measures for 15-25 percent no harvest retention areas in each treatment would maintain some lodgepole pine presence and be available for nesting purposes.

The 1,079 acres of fuels only treatments would focus on small diameter thinning of green trees less than eight inches in diameter which is at the lower diameter range described by Goggans et al. (1989) used by three-toed woodpeckers for nesting. Therefore, the fuels treatments would only have a minimal impact on three-toed woodpeckers because the majority of the potential nest-sized lodgepole pine trees would be

retained. There should be no reduction in the number of nesting pairs of three-toed woodpeckers utilizing the Walker Mountain OGMA based on the 1989 Goggans et al. study.

***Walker Rim OGMA***

***Goshawk***

Alternative D proposes the same treatment units as Alternative C with the same 311 acres of commercial treatment (thinning, improvement cuts, group selection, and aspen enhancement) and 387 acres of 'fuels only' treatments, of which approximately 105 acres of commercial treatment and 195 acres of 'fuels only' treatments would occur within the 1,111 acres of mapped goshawk nesting habitat in this OGMA. However, there is a slight difference in silvicultural prescriptions for some of the acreage for Alternative D. The commercial treatment portion with post-sale activities of small diameter thinning and brush mowing and/or underburning within mapped goshawk nesting habitat would be similar as described in Alternative C. Within unit 690, approximately 20 acres are mapped as goshawk nesting habitat and would have a prescription of small openings two to five acres in size on 30 percent of the unit acreage. All trees would be removed in these openings and would represent about six acres of openings in unit 690 with the remaining 14 acres having a standard understory thin. Neither the small openings in unit 690 nor the thinned acreage in 690 and additional units would meet the 40 percent canopy cover level defined as the minimum needed for goshawk nesting habitat post-harvest. The thinned acreage would be capable of returning to nesting habitat capability within several decades with additional increases in canopy growth from the residual trees.

The approximately 195 acres of 'fuels only' treatments in goshawk nesting habitat would only remove green trees <8 inches in diameter followed by brush mowing and/or prescribed underburning. These actions are not expected to negatively affect nesting habitat because the largest and dominant overstory trees provide the greatest contribution toward canopy cover. While approximately 255 acres of goshawk nesting habitat would be converted into potential foraging habitat, the remaining 856 acres would be fully capable of supporting nesting goshawks.

***Marten***

Alternative D proposes the same treatment units as Alternative C with the same 311 acres of commercial treatment and 387 acres of 'fuels only' treatments, of which approximately 20 acres of commercial treatment and 143 acres of 'fuels only' treatments would occur within the 517 acres of mapped marten denning habitat. Unit 621 (39 acres in the OGMA, and 20 acres in marten denning habitat) is an aspen enhancement unit designed to remove conifers less than 21 inches diameter in five small openings up to two acres each to reduce competition to the existing aspen trees. Two, 2-acre openings would be created in marten denning habitat, with the remaining 16 acres having understory thinning. The small openings would not function as denning habitat though the commercial thinning portion would have canopy reduced to about 30-35 percent, what was defined as marten denning habitat based on the Raphael and Jones marten study on the adjacent Winema National Forest (1997). There would be a reduction in stand diversity with less canopy layering, though snags and down wood would not be reduced. Post-harvest the thinned acreage of this unit should still maintain its capability to support a denning female marten.

Approximately 153 acres of fuels treatments would occur on the flats and lower slopes of the OGMA within mapped marten denning habitat. Activities proposed include small diameter thinning (<8 inches diameter) and brush mowing or prescribed burning. The small trees that would be removed are not large enough to act as a den site though they do contribute to stand structural diversity and provide additional protection from avian predation. The mowing and/or burning would have the capability to reduce small mammal habitat (snowshoe hares, squirrels, chipmunks) that provide a prey base for marten.

Raphael and Jones (1997) conducted a study of marten on the adjacent Winema National Forest and estimated male marten home ranges at 4,272 acres and 1,392 acres for females. Based on these estimates,

the Walker Rim OGMA by itself is not large enough to support one male marten home but may support several female home ranges that extend onto adjoining National Forest lands. The 153 acres of fuels treatments would reduce prey availability for martens but would be partially mitigated with the retention of no treatment blocks averaging 15 percent in each unit. These blocks would continue to function as foraging areas for marten and denning habitat would still be available to support individual animals.

***Three-toed Woodpecker***

Alternative D proposes the same treatment units as Alternative C with the same 311 acres of commercial treatment and 387 acres of 'fuels only 'treatments, of which approximately 40 acres of commercial treatment and 163 acres of 'fuels only' activities would occur within the 996 acres of three-toed woodpecker nesting habitat. The 40 acres of commercial treatment would occur in mixed conifer forest dominated by ponderosa pine, white fir, Douglas-fir, and a few aspen trees in unit 621 with an understory component of lodgepole pine, Douglas-fir, and white fir. A Goggans et al. (1989) study of black-backed and three-toed woodpeckers on the Deschutes National Forest showed three-toed woodpeckers nested exclusively in lodgepole pine with heartrot. They also determined that home range size of three male three-toed woodpeckers ranged from 131 to 751 acres and was not related to the amount of unlogged areas or the amount of mature and immature forest present.

The commercial treatment would remove lodgepole that is potentially large enough diameter (7-17 inches) described by Goggans et al. (1989) as used for nesting. Mitigation measures for 15-25 percent no harvest retention areas in each treatment would maintain some lodgepole pine presence and be available for nesting purposes. The 163 acres of fuels only treatments would focus on small diameter thinning of green trees less than eight inches in diameter which is at the lower diameter range described by Goggans et al. (1989) used by three-toed woodpeckers for nesting. Therefore, the fuels treatments would only have a minimal impact on three-toed woodpeckers because the majority of the potential nest-sized lodgepole pine trees would be retained. There should be no reduction in the number of nesting pairs of three-toed woodpeckers utilizing the Walker Rim OGMA based on the 1989 Goggans et al. study.

**Alternative E**
**Direct and Indirect Effects**

***Little Deschutes OGMA***

***Goshawk***

Because Alternative E proposes the same units with the same prescriptions as Alternatives B, C, and D the effects would be similar. Post-harvest canopy cover would likely range from 30-35 percent and below the minimum 40 percent level the Crescent Ranger District uses to define goshawk nesting habitat. However, the remaining 200 acres would stay in a passive management strategy capable of providing nesting acreage for a pair of goshawks. The 57 acres of thinned stands may function as goshawk foraging habitat but may also re-develop into nesting suitability within one to two decades with canopy cover increasing approximately five percent per decade.

***Railroad OGMA***

***Three-toed Woodpecker***

Alternative E proposes the same 71 acres of commercial treatment with the same effects described for Alternatives C and D. It also has the same 21 acres of fuels treatments described for Alternatives C and D with similar effects. The commercial treatment would reduce the risk of large tree loss to density competition, beetle attacks, and/or uncharacteristic wildfire. The 21 acres of bitterbrush mowing and prescribed fire would take place in a small stand dominated by ponderosa pine. The burning may result in the mortality of a few understory lodgepole and/or ponderosa trees but would not appreciably change the character of this portion of the OGMA. Its ability to provide nesting, roosting, and foraging habitat for the three-toed woodpecker would be maintained.

***9751 OGMA***

***Goshawk and three-toed Woodpecker***

Because Alternative E proposes the same treatment units and prescriptions as Alternatives C and D the effects would be the same as Alternatives C and D. The fuels treatments would not result in any loss of goshawk nesting habitat nor any loss of three-toed woodpecker nesting, foraging, or roosting habitat.

***Walker Mountain OGMA***

***Goshawk***

Implementation of Alternative E would result in 138 acres of commercial thinning, 92 acres of alternative mistletoe treatment, and 1,079 acres of fuels treatments utilizing small diameter thinning, shrub mowing and/or prescribed underburning. None of the commercial treatments would occur within stands currently functioning as goshawk nesting habitat. The small diameter thinning (<8 inches diameter) would not negatively affect nesting habitat because the large and dominant overstory trees provide the greatest contribution toward canopy cover. The mowing and/or underburning in the ponderosa pine stands would also have no impact on goshawk nesting habitat.

***Marten***

Only 41 acres (unit 975) of the 230 acres planned for commercial treatment is mapped as denning habitat. None of the 92 acres of alternative mistletoe treatment would occur in marten denning habitat. Unit 975 (41acres) is mapped as denning habitat and the commercial treatment would likely reduce the canopy cover in the range of 30-35 percent defined as denning habitat based on Raphael and Jones marten study (1997). There would be a reduction in stand diversity with less canopy layering, though snags and down wood would not be reduced. Post-harvest this unit should still maintain its capability to support a denning female marten.

Approximately 200 of the 1,079 acres of fuels treatments are located mid-slope on the OGMA and within mapped marten denning habitat. Activities proposed include small diameter thinning (<8 inches diameter) and brush mowing or prescribed burning. The small trees that would be removed are not large enough to act as a den site though they do contribute to stand structural diversity and provide additional protection from avian predation. The mowing and/or burning would have the capability to reduce small mammal habitat (snowshoe hares, squirrels, chipmunks) that provide a prey base for marten.

Raphael and Jones (1997) conducted a study of marten on the adjacent Winema National Forest and estimated male marten home ranges at 4,272 acres and 1,392 acres for females. Based on these estimates, the Walker Mountain OGMA by itself is not large enough to support one male marten home range but may support several female home ranges that overlap with adjoining National Forest lands. The 200 acres of fuels treatments in denning habitat would reduce prey availability for martens but would be partially mitigated with the retention of no treatment blocks averaging 15 percent in each unit. These would continue to function as foraging areas for marten and denning habitat would still be available to support individual animals.

***Three-toed Woodpecker***

Within the 230 acres of commercial treatment, the 92 acres of alternative mistletoe treatment (removing all heavily infected trees less than 21 inches diameter and creating snags of infected trees greater than 21 inches diameter) are not defined as nesting habitat. The remaining 138 acres are dominated by ponderosa pine but has an understory component of lodgepole pine of varying sizes capable of supporting nesting three-toed woodpeckers. A Goggans et al. (1989) study of black-backed and three-toed woodpeckers on the Deschutes National Forest showed three-toed woodpeckers nested exclusively in lodgepole pine with heartrot with nest trees ranging from 7-17 inches diameter. The commercial treatment would remove lodgepole large enough to function as a nest tree. However, mitigation measures for 15-25 percent no

harvest retention areas in each treatment unit would maintain some lodgepole pine presence and be available for nesting three-toed woodpeckers. Goggans et al. (1989) also determined that home range size of three male three-toed woodpeckers ranged from 131 to 751 acres and was not related to the amount of unlogged areas or the amount of mature and immature forest present.

The 1,079 acres of fuels only treatments would focus on small diameter thinning of green trees less than eight inches in diameter which is at the lower diameter range described by Goggans et al. (1989) used by three-toed woodpeckers for nesting. Therefore, the fuels treatments would only have a minimal impact on three-toed woodpeckers because the majority of the potential nest-sized lodgepole pine trees would be retained. Because there are an estimated 1,692 acres of three-toed woodpecker nesting habitat in the OGMA, planned actions should not result in any reduction of number of nesting pairs of three-toed woodpeckers utilizing the Walker Mountain.

***Walker Rim OGMA***

***Goshawk***

Implementation of Alternative E would result in 783 acres of commercial treatment, including 188 acres of alternative mistletoe treatment, 68 acres of commercial thinning, 488 acres of improvement cuts, and 39 acres of aspen enhancement. There would also be 387 acres of fuels only activities, totaling 1,170 acres of treatments in this OGMA. Within the mapped 996 acres of goshawk nesting habitat, there would be approximately 148 acres of commercial treatment, including 24 acres of alternative mistletoe treatment and 195 acres of 'fuels only' activities, totaling 343 acres.

The majority of the commercial treatment effects would be similar to those described for other alternatives and OGMAs in that post-treatment canopy cover is expected to be below the 40 percent threshold defined as the minimum for nesting stands. This would be short-term effect lasting several decades or until canopy growth of the residual trees meets measures at least 40 percent. In the alternative mistletoe treatment acreage, all trees under 21 inches diameter heavily infected with mistletoe would be removed and those trees over 21 inches diameter with heavy mistletoe would have induced mortality to reduce the likelihood of the infection spreading. These 24 acres would also not have enough canopy cover to provide goshawk nesting habitat and would have a longer return interval (more than two to three decades) before returning to nesting capability. For both treatments, the mitigation measure for 15-25 percent unharvested acreage in each unit could continue to function as a block of nesting habitat in the OGMA.

The approximately 195 acres of fuels only treatments in goshawk nesting habitat would only remove green trees <8 inches diameter followed by brush mowing and/or prescribed underburning. These actions are not expected to negatively affect nesting habitat because the largest and dominant overstory trees provide the greatest contribution toward canopy cover. While 148 acres of goshawk nesting habitat would be converted into potential foraging habitat, the remaining 848 acres of goshawk nesting habitat would be fully capable of supporting nesting goshawks.

***Marten***

Implementation of Alternative E would result in 783 acres of commercial treatment, including 188 acres of alternative mistletoe treatment, 68 acres of commercial thinning, 488 acres of improvement cuts, and 39 acres of aspen enhancement. There would also be 387 acres of fuels only activities, totaling 1,170 acres of treatments in this OGMA. Within the mapped 517 acres of marten denning habitat, there would be approximately 24 acres of commercial treatment and 160 acres of fuels activities totaling 184 acres. Unit 621 (39 acres in the OGMA, and 20 acres in marten denning habitat) is an aspen enhancement unit designed to remove conifers less than 21 inches diameter in five small openings up to two acres each to reduce competition to the existing aspen trees. Two, 2-acre openings would be created in marten denning habitat, with the remaining 16 acres having understory thinning. The small openings would not function

as denning habitat though the commercial thinning portion (16 acres in unit 621 plus four acres in unit 630) would have canopy cover reduced to about 30-35 percent, what was defined as marten denning habitat based on the Raphael and Jones marten study on the adjacent Winema National Forest (1997). There would be a reduction in stand diversity with less canopy layering, though snags and down wood would not be reduced. Post-harvest the thinned acreage of these units should still maintain their capability to support a denning female marten.

Approximately 160 acres of fuels treatments would occur on the flats and lower slopes of the OGMA within mapped marten denning habitat. Activities proposed include small diameter thinning (<8 inches diameter) and brush mowing or prescribed burning. The small trees that would be removed are not large enough to act as a den site though they do contribute to stand structural diversity and provide additional protection from avian predation. The mowing and/or burning would have the capability to reduce small mammal habitat (snowshoe hares, squirrels, chipmunks) that provide a prey base for marten.

Raphael and Jones (1997) conducted a study of marten on the adjacent Winema National Forest and estimated male marten home ranges at 4,272 acres and 1,392 acres for females. Based on these estimates, the Walker Rim OGMA by itself is not large enough to support one male marten home but may support several female home ranges that may extend onto adjoining National Forest lands. The 160 acres of fuels treatments would reduce prey availability for martens but would be partially mitigated with the retention of no treatment blocks averaging 15 percent in each unit. These blocks would continue to function as foraging areas for marten and denning habitat would still be available to support individual animals.

***Three-Toed Woodpecker***

Implementation of Alternative E would result in 783 acres of commercial treatment, including 188 acres of alternative mistletoe treatment, 68 acres of commercial thinning, 488 acres of improvement cuts, and 39 acres of aspen enhancement. There would also be 387 acres of fuels only activities, totaling 1,170 acres of treatments in this OGMA. Within the mapped 1,692 acres of three-toed woodpecker nesting habitat, there would be approximately 83 acres of commercial treatment, including four acres of alternative mistletoe treatment, and 240 acres of ‘fuels only’ activities, totaling 323 acres.

The commercial treatment would occur in largely mixed conifer forest dominated by ponderosa pine, white fir, Douglas-fir, and a few aspen trees and a ponderosa pine stand with a component of lodgepole pine. A Goggans et al. (1989) study of black-backed and three-toed woodpeckers on the Deschutes National Forest showed three-toed woodpeckers nested exclusively in lodgepole pine with heartrot. They also determined that home range size of three male three-toed woodpeckers ranged from 131 to 751 acres and was not related to the amount of unlogged areas or the amount of mature and immature forest present.

The commercial treatment would remove lodgepole that is potentially large enough diameter (7-17 inches) described by Goggans et al. (1989) as used for nesting. Mitigation measures for 15-25 percent no harvest retention areas in each treatment would maintain some lodgepole pine presence and be available for nesting purposes. The 240 acres of ‘fuels only’ treatments would focus on small diameter thinning of green trees less than eight inches in diameter which is at the lower diameter range described by Goggans et al. (1989) used by three-toed woodpeckers for nesting. Therefore, the fuels treatments would only have a minimal impact on three-toed woodpeckers because the majority of the potential nest-sized lodgepole pine trees would be retained. There should be no reduction in the number of nesting pairs of three-toed woodpeckers utilizing the Walker Rim OGMA based on the 1989 Goggans et al. study.

**Cumulative Effects To All Action Alternatives**

Table 19 was reviewed for project actions that have a similar zone of influence and overlap in time and space with the Rim-Paunina vegetation management project. The zone of influence is defined as the 40,000 acre project area. There are no projects in the table that overlap and therefore, additive cumulative

effects are not anticipated to occur. The approximately 106 acres of private land acreage within the planning area is within the Two River North rural housing subdivision. It is assumed very little habitat would be available for goshawk, marten, or three-toed woodpeckers because of land owners' abilities to manage their properties as they wish.

# Forested Vegetation

The following incorporates the forested vegetation specialist report in its entirety. The Zone of Influence for assessing effects is at the project scale.

**Management Direction**

The Rim-Paunina planning area is managed under direction provided by the Deschutes National Forest Land and Resource Management Plan (LRMP; USDA Forest Service 1990) as amended by the Regional Forester's Plan Amendment 2, Interim Riparian, Ecosystem, and Wildlife Standards (Eastside Screens).

**Eastside Screens has the following direction relating to forested vegetation:**

***Historical Range of Variability*:** Characterize the proposed timber sale and its associated watershed for patterns of stand structure by biophysical environment and compare to the Historical Range of Variability (HRV).

***Timber Sale within Late and Old Structure (LOS)*:** Some timber sale activities can occur within LOS stages that are within or above HRV in a manner to maintain or enhance LOS within that biophysical environment. It is allowable to manipulate one type of LOS to move stands into the LOS stage that is deficit if this meets historical conditions (Eastside Screens, Appendix B, Scenario A, page 9).

Within a particular biophysical environment within a watershed, if the single, existing late and old structure (LOS) stage is within or above HRV, or if both types of LOS stages occur and both are within or above HRV, then timber harvest can occur within these stages as long as LOS conditions do not fall below HRV (Eastside Screens, Appendix B, Scenario B, page 13). The Rim-Paunina project proposes activity within LOS stands. There would be no net loss of LOS stands for all action alternatives.

Maintain all remnant late and old seral and/or structural live trees greater than 21 inches in diameter that currently exist within stands proposed for harvest activities (Eastside Screens, Appendix B, page 10).

***Methodology of Analysis and Sources of Information***

Sources of vegetation information and data used in this analysis are: IMAP, PI data, Deschutes National Forest Plant Association Map, 2009 infrared and color aerial photography, walk-through stand exams and diagnosis (2008-2009), and Mistletoe surveys (2010). Computer modeling includes the following:

***IMAP***

The Interagency Mapping and Assessment Project (IMAP) provides maps of existing forest vegetation and land cover across all land ownerships in the Pacific Coast States (Oregon, Washington, and parts of California). The mapping is integrated with ongoing sample-based forest inventories conducted by the Forest Inventory and Analysis program (FIA) at the Pacific Northwest (PNW) Station, and Current Vegetation Survey of Region 6, USDA Forest Service, and the Bureau of Land Management (BLM) in western Oregon. Gradient imputation (Gradient Nearest Neighbor, or GNN; Ohmann and Gregory 2002) is used to map detailed vegetation composition and structure for areas of forest and woodland. GNN uses multivariate gradient modeling to integrate data from FIA field plots with satellite imagery and mapped environmental data. A suite of fine-scale plot variables is imputed to each pixel in a digital map, and regional maps can be constructed for many of the same vegetation attributes available for FIA plots. All GNN map products are grid-based at 30-m spatial resolution. This data along with field reconnaissance and Viable Ecosystem Modeling was used to determine existing and predicted future conditions within the analysis area. Since the IMAP data was gathered for this analysis, a small amount of precommercial thinning has occurred in existing plantations; however this would not greatly alter the analysis.

***Photo Interpretation GIS Layer***
Individual stands were delineated for the entire Deschutes National Forest using photo interpretation between 1997 and 2000 (Forest Data Inc. 2001).

***Viable Ecosystem Model***
The Viable Ecosystem model provides a process to apply ecosystem standards to project-level planning. Originally developed for the Ochoco National Forest, it has since been modified for use on the Deschutes National Forest. This system compares existing vegetation with site potential (or biophysical environment). The model focuses on relationships between combinations of vegetation structure and species composition, and habitat requirements for animals, insects, and plants. The Viable Ecosystem model stratifies the environmental gradient using plant associations. The Viable Ecosystems Management Guide (Simpson 1994) was used within the Rim-Paunina planning area to characterize and compare seral structural conditions to HRV (and contains a description of Viable Ecosystem and analysis methods and tools used to conduct the analysis). Table 74 displays the attributes modeled.

**Table 74. Seral/Structural Matrix and Definitions (Seral Structural Stages)**

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

***Forest Vegetation Simulator – Southern Oregon Northern California Variant***
The Forest Vegetation Simulator (FVS) is an individual-tree, distance-independent growth and yield model. It has been calibrated for specific geographic areas (variants) of the United States. FVS can simulate a wide range of silvicultural treatments for most major forest tree species, forest types, and stand conditions.

***Limitations***
Given the uncertainty of any modeling exercise, the results are best used to compare the relative effects of the alternatives, rather than as an indicator of absolute effects.

**Assumptions and Methods**

- Due to the complexities of modeling thousands of pixels, treatments were characterized by the estimated percent of basal area removed from either above (starting with the dominant or codominant crown class or largest trees) or below (starting with the suppressed crown classes or

smallest trees). This causes more of an average over a landscape scale where site-specific vegetative prescriptions are accomplished prior to layout for activity.

- Project planning refers to individual timber sales or other activities.

- The viable outputs of dense and open stands are corollaries for multi and single story stands. The medium/large structure class is equivalent to Late and Old Structure (LOS), as identified in the Eastside Screens, in all plant associations other than lodgepole. The small and medium/large structure class is equivalent to lodgepole LOS.

- Hawksworth (1977) rating system was utilized to determine infestation levels of dwarf mistletoe severity (see Figure 36).

- Current and future vegetation structure and condition GNN data was obtained for the Rim-Paunina planning area and processed using FVS to simulate treatments and future growth for each alternative. FVS results were categorized by Viable Seral/Structural states.

- Determining locations of LOS stands the GNN pixilated data was aggregated into stand level values in order to determine areas of LOS and other structural and compositional characteristics. Using a Geographic Information System (GIS) software package, the GNN data was overlaid on the Photo Interpretation stands. The values of each pixel in every stand were counted and the value which was most common was assigned to the entire stand.

**Conditions common to all Plant Association Groups (PAGs) are as follows:**

- Past clearcuts and shelterwood regeneration cuts are common in all but high elevation mountain hemlock and whitebark pine plant associations. These are typically stocked with ponderosa pine or lodgepole pine, that are mostly twenty years old or more. These stands have been accounted for in the modeling and existing condition discussion.

- Small trees in many of the regenerated stands have been thinned. Standard practice on the Crescent Ranger District is to retain at least ten percent of the unit unthinned for diversity.

- Stumps of trees cut in the 1950s are common on most ponderosa pine and mixed conifer areas that did not have regeneration cuts. Generally, these were ponderosa pine cut to meet the Keen's Risk Tree Classification (Miller and Keen 1960) based on age and vigor, to remove the trees most highly susceptible to western pine beetle.

- During the 1970s, it was common in this area to fall large dead trees (snags) and leave them lying on the ground. This was done to reduce the chance of lightning-caused fires since the thinking of the day was that these large snags could attract lightning similar to a lightning rod. This most often was done to the largest and oldest snags since they could be spotted from a distance, were generally the taller trees in the stands, and they were the result of endemic bark beetle activity in these stands rapidly becoming overstocked.

- Shrubs are common in disturbed areas on most of the sites. In the dry lodgepole pine and ponderosa pine, bitterbrush is a common shrub that can eventually dominate the ground vegetation until shaded out by a closed canopy of conifers. Snowbrush ceanothus and greenleaf manzanita are common in the mixed conifer dry and ponderosa pine wet stands. Golden chinquapin is also a common shrub in some of the higher productivity areas. Upland willow can be found in some mixed conifer areas.

**Current Conditions**
While there is no ideal reference condition for any ecosystem or landscape (Temperton et al. 2004) historical range of variability or HRV can provide a useful yardstick for current and possible future conditions. HRV value is based on the premise that it is likely to support a diverse array of species, even those we know little about, and due to the enormous complexity of ecosystems HRV is a practical way to measure effects on ecosystems (Landres 1999; Keane 2009).

The forests of central Oregon and the Rim-Paunina planning area are dynamic and ever changing. Their structure and composition affect many things valued by society. Two of the most prominent in the Rim-Paunina planning area are varied wildlife habitats and wood fiber based products available to the local economy. It is important to not only look at these currently or immediately following potential treatments but also into the future. Forest structure and composition is also affected by disturbance processes. The relationship of structure to wildlife habitats is further discussed in the Wildlife section of this chapter. Wood fiber based products and their effects associated with the local economy are disclosed in the Social-Economic section of this chapter.

***Bark Beetles***
Mountain pine beetle (*Dendroctonus ponderosae*) and Western pine beetle (*Dendroctonus brevicomis*) have been the two most prevalent bark beetles in the Rim-Paunina area. Mountain pine beetle's preferred host is lodgepole pine but is also active in ponderosa pine and sugar pine. Western pine beetle is primarily active in ponderosa pine and is in epidemic proportions on the bordering Fremont-Winema National Forests. It is also present in several stands north of the project area on the Bend-Ft. Rock Ranger District near the Cascade Mountains. In central Oregon, mountain pine beetle becomes a risk in lodgepole pine stands when they have more than 100 trees per acre over nine inches in diameter (Eglitis 2010). Outbreaks can cause mortality in large swaths that have this condition. This usually happens when the stand is around 100 years old. In ponderosa pine and mixed conifer stands, bark beetles become active around 60 percent of maximum Stand Density Index[23] or SDI (Cochran et al. 1994). Many of the stands within the Rim-Paunina project area have reached this density. Mortality tends to occur in various sized pockets that center around the largest, most stressed trees in a stand. Trees with more than 2/3 of the crown infected with dwarf mistletoe also have a higher risk of bark beetle attack (Eglitis 2010). Using these assumptions, currently 17 percent of the Rim-Paunina planning area is at risk of bark beetles.

**Existing Conditions**
Descriptions of the current vegetative condition are grouped by plant association groups, or PAGs. The plant associations have been evaluated for common characteristics and grouped together to form the PAGs. A very brief description of each PAG begins each section. Detailed PAG biophysical descriptions can be found in Plant Associations of the Central Oregon Pumice Zone (Volland 1988).

**Lodgepole Pine -** includes the lodgepole pine dry and a minor component of the lodgepole pine wet plant association groups. Totaling approximately 17,000 acres and 43 percent of the planning area, lodgepole pine is the largest plant series in the Rim-Paunina planning area. Lodgepole pine is characterized by stands dominated by lodgepole pine in some of the lower productivity plant associations located at the lowest or highest elevations of the planning area. Lodgepole pine wet plant associations are characterized by stands dominated by lodgepole pine in some of the moister plant associations, typically along streams or wet areas. There are less than 200 acres of these stands (lodgepole pine wet) in the Rim-Paunina area.

[23] Stand Density is a degree of crowding of trees, well correlated with stand volume and growth. It is an index or measure of stocking of a stand based upon a number of trees per unit area and diameter of the average basal area.

Vegetation is characterized by lodgepole pine dominating the conifer component. The regenerated stands tend to be very dense with natural regeneration often supplementing any planted trees to the point where several thousand trees per acre may be found.

During the 1980s, a mountain pine beetle (*Dendroctonus ponderosae*) outbreak killed most of the lodgepole pine overstories throughout most of central Oregon in the lower elevations. Thousands of acres of salvage activities in these stands have been completed since then, but some areas in the analysis area remain that had very little or no active management. These areas are characterized by "jackstrawed" remains of the fallen overstory trees, remaining overstory trees usually less than eight inches in diameter, most often with very poor crowns, and dense natural regeneration from the residual overstory trees.

With respect to mistletoe, past salvage activities focused on the removal of the dead component only. Live trees, regardless of health, were generally retained. This created ideal conditions for dwarf mistletoe to spread throughout the stand. Many overstory trees infected with dwarf mistletoe are now infecting the seedlings below. This is likely more prevalent than historically found due to the lack of fire following the insect outbreak.

Figure 20 shows the current structure and composition of lodgepole pine within the project area. The "X" axis progresses from left to right from early to late structural stages. Notice most structures are within the minimum and maximum HRV, except L5a (late) and L5b (late). These stages are defined as "medium/large trees 21 inches in diameter and larger" for both low and high density stands. Although there are a few lodgepole pine in the project area of that size, the abundance is due to scattered ponderosa pine which is a minor component of these stands.

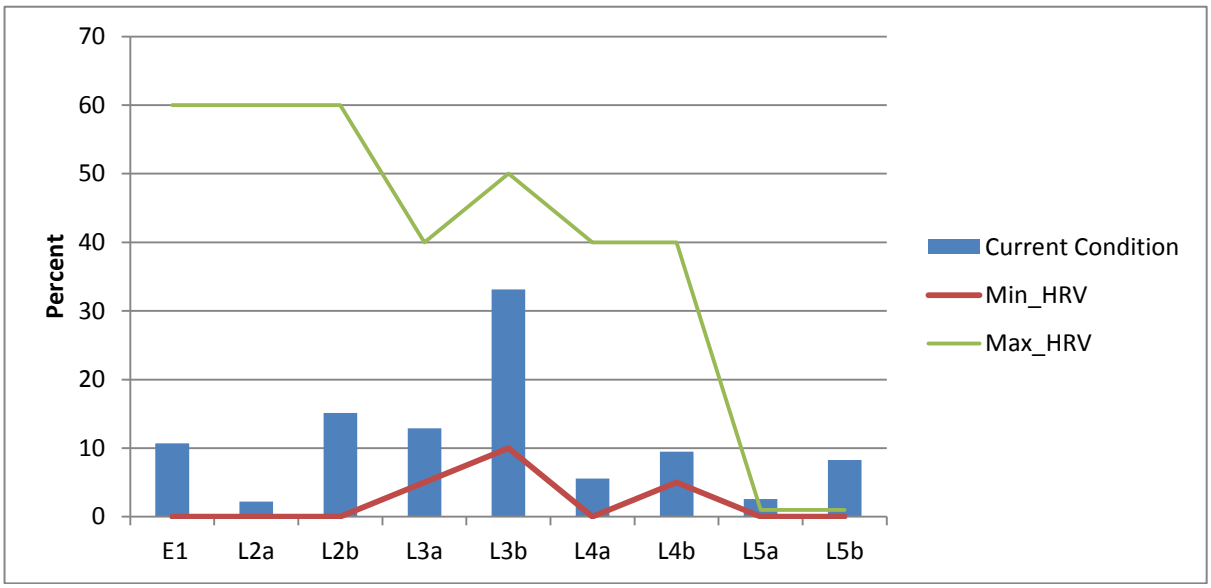



**Figure 20. Current Structure and Composition of Dry Lodgepole Pine**

Lodgepole pine is generally within its HRV. Its disturbance history was marked by episodic insect outbreaks and fire creating a broad range of conditions. The excess in large structure is likely a result of fire exclusion.

**Ponderosa Pine -** accounts for approximately 15,500 acres and 39 percent of the planning area. These stands tend to be in locations that are elevated above areas of cold air drainage, the lower slopes of the Cascade Range, and Walker Rim.

The largest overstory trees are 200 to 400 years old. Fire scars are common. Understory trees are ponderosa pine, with lodgepole pine often outnumbering them. The dense stands of ponderosa pine regeneration can often stagnate rather than show much competition-induced mortality.

Figure 21 shows current structural stage of ponderosa pine within the project area. Notice the over abundance of dense/multistory stands (E3a, M3a, L3a, L5a) and a lack of open/ single story stands, especially in the large structure classes (M5b, L5b). This is most likely caused by fire exclusion and past harvest practices that generally did not lower the density in the smaller size classes.

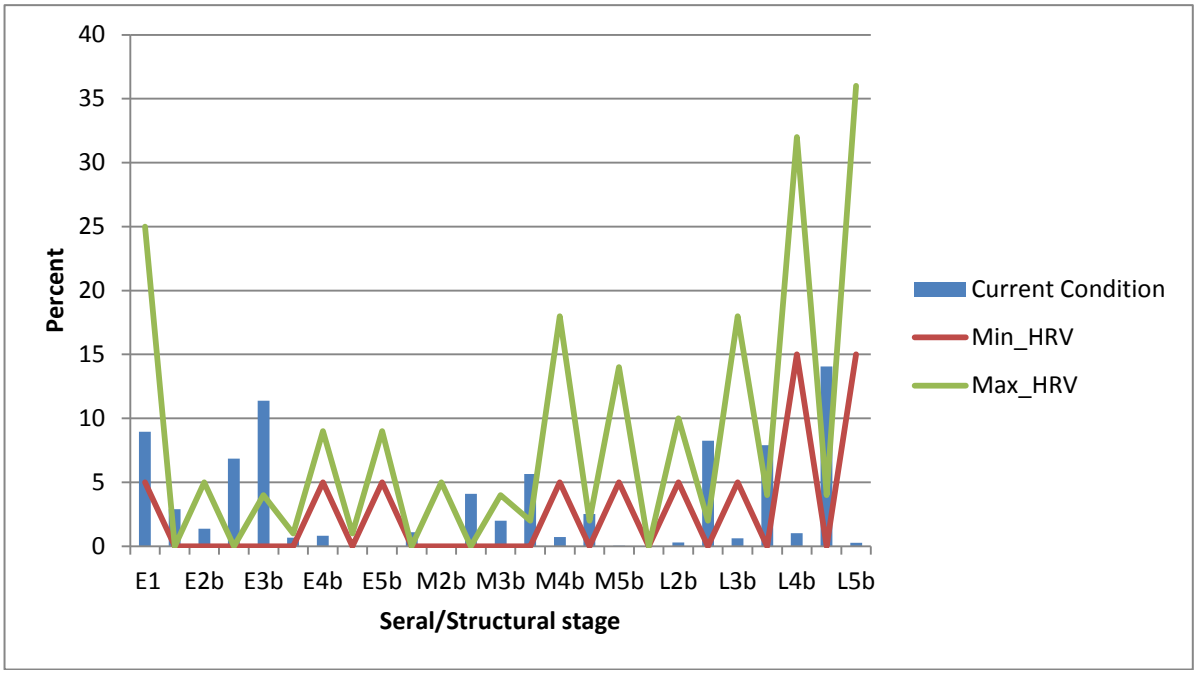



**Figure 21. Current Structure and Composition of Ponderosa Pine**

(Note that only the labels for the open "b" stages are shown while the dense "a" stages are unlabeled)

Ponderosa pine is primarily showing an over abundance of dense/multistory stands and a lack of open/ single story stands, especially in the large structure classes. This is most likely caused by fire suppression and past harvest practices.

**Mixed Conifer** - This PAG includes Mixed Conifer Dry (MCD) of approximately 7,000 acres and 18 percent of the planning area. These stands are typically located on mid-elevation slopes ranging from about 4,500 feet to over 6,000 feet in elevation. Stands are dominated by a variety of conifer species.

Ponderosa pine, sugar pine and, in some areas, Douglas-fir comprise the oldest and usually the largest trees in the overstories of these stands. Fire scars, scorched bark, and scattered charcoal on the ground are very common on these sites. Mid and understories are usually dominated by true firs in dense, pole-sized thickets. Lodgepole pine is a common component of the mid and understories of these stands as well. Down and dead lodgepole pine is a common component of these stands.

At the higher elevations, the true firs are dominated by Shasta red fir, which is fairly common on the Crescent Ranger District. Grand fir/white fir dominates the mid and lower elevations. Douglas-fir is common as is ponderosa pine, but both are definitely subordinate in stocking to the other species. Isolated mountain hemlock is also present in many of these stands.

As shown in Figure 22, Mixed Conifer Dry is lacking large trees in the mid and late seral stages primarily in the open/ single story structure stages. The early seral shrub/forb stage (E1) is also below HRV. Fire exclusion and past harvest practices are the most likely cause of these departures.

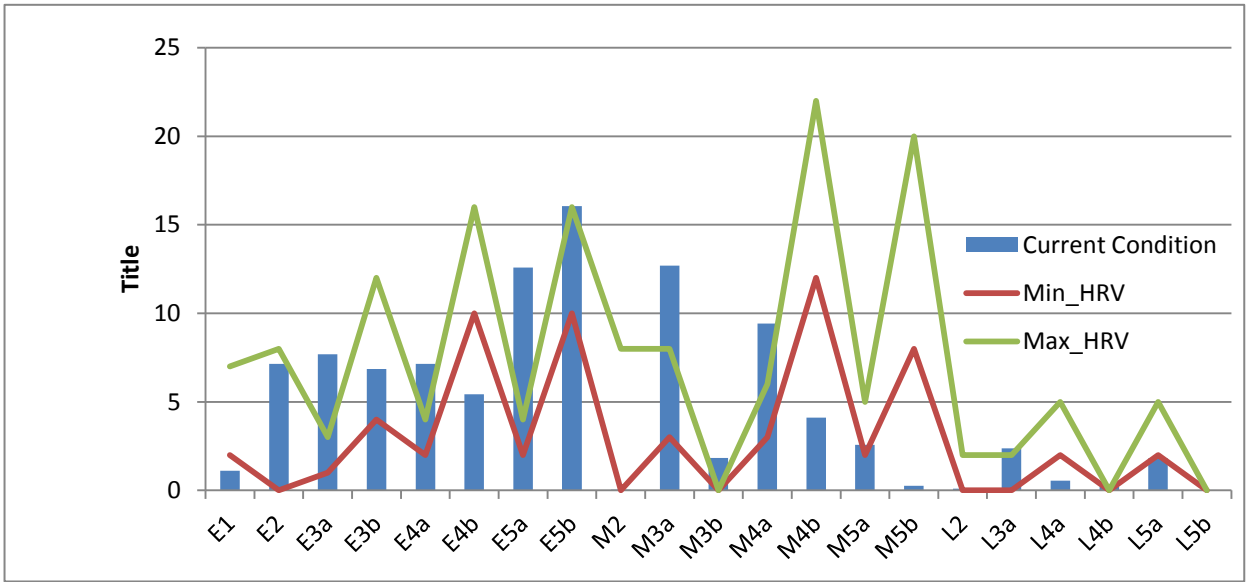



**Figure 22. Current Structure and Composition of Mixed Conifer Dry**

## Late and Old Structure (LOS)

### Ponderosa Pine and Mixed Conifer

The following figures (Figure 23 and Figure 24) show the current condition for LOS by PAG for general information on the structure and abundance as well as for determination of compliance with the Eastside Screens. Lodgepole pine is currently within HRV for both single story and multistory LOS categories; therefore it is not depicted here. Notice the over abundance of dense LOS and a lack of open as well as total LOS for ponderosa pine and to a lesser extent, mixed conifer, which is within the total HRV. There are currently no stands in the Ponderosa PAG classified as "open" within the Rim-Paunina area.

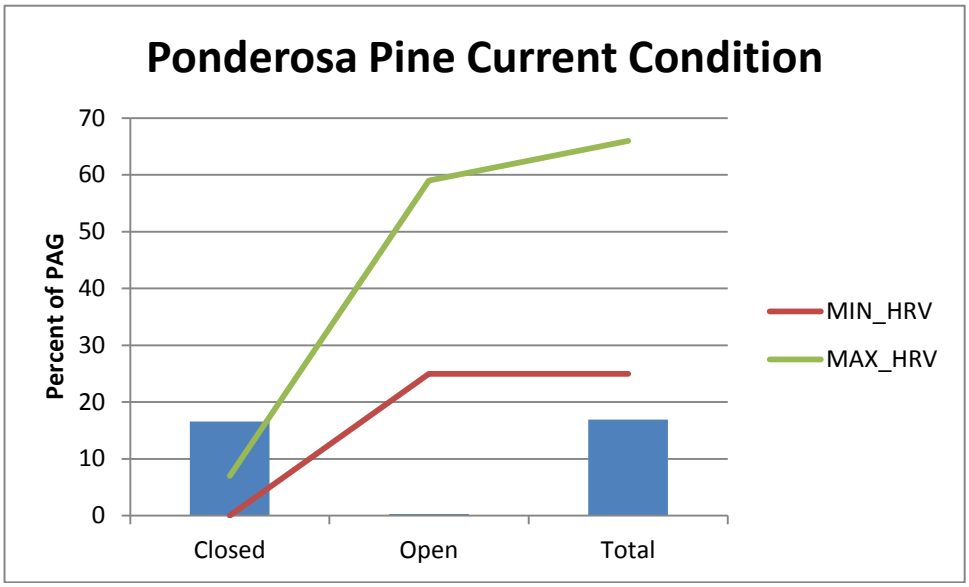



**Figure 23. Current Condition of Ponderosa Pine in Rim-Paunina Project Area**

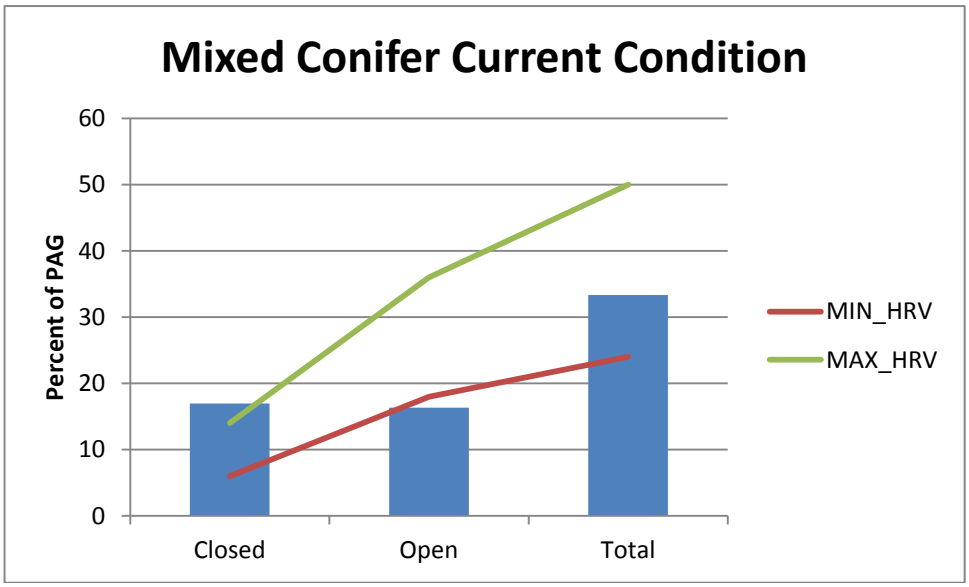



**Figure 24. Current Condition of Mixed Conifer in the Rim-Paunina Project Area**

**Direct and Indirect Effects**
**Alternative A**
Under the No Action alternative, current management plans would continue to guide management of the analysis area. No active management to place appropriate stands into a condition for a frequent low-intensity fire regime would occur. Custodial activity would continue, such as routine maintenance, and response to environmental emergencies, such as suppression of a wildfire, would continue. The shift in stand composition with fire intolerant species in competition with the larger trees would persist. Also, LOS as depicted in Figure 23 and Figure 24 for ponderosa pine and mixed conifer would continue to move from open to dense, which eventually results in mortality and reduced overall total late and old structure. Bark beetle risk, currently at 17 percent, would likely increase as stands become more dense.

A passive management scenario would continue the path of disturbance identified in the District-wide 1998 Landscape Analysis Process. In the Rim-Paunina area, the gap between the current habitat condition for white-headed woodpeckers, as well as other species that depend on large diameter ponderosa pine trees in open conditions and what is desired would become greater. Overcrowding and competition with the larger trees which is now evident would result in a mortality level that is expected to increase faster than large diameter trees can develop. The presence of dense understory trees and high levels of brush increase the risk of white-headed woodpecker nests being preyed upon by squirrels and chipmunks. There will be substantially fewer large trees within the next two decades thus further diminishing an important habitat component for this woodpecker.

**Action Alternatives (B-E)**
The following are descriptions of the activities associated with the various action alternatives:

***Thinning (HTH) for all action alternatives***
Within the Rim-Paunina Project area and most prevalent in ponderosa pine plant association, HTH is cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality (Helms 1998). Trees would be thinned to a density within the management zone[24] with thought to future growth within the next 20 or 30 years before the next likely opportunity for a commercial treatment. This would primarily be achieved by thinning from below – the removal of trees from the lower crown classes to favor those in the upper crown classes (Helms 1998). After thinning, stands would average as low as 20 percent canopy cover and 50 square feet of basal area in lodgepole pine and up to 40 percent canopy cover and 180 square feet of basal area in mixed conifer plant associations.

***Improvement Cutting (HIM) for all action alternatives***
HIM is the removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality (Helms 1998). Improvement cutting activities are primarily proposed in lodgepole pine stands that were affected by the mountain pine beetle outbreak of the 1980s. The proportion of their overstories that exhibit poor crowns and/or heavily-infected mistletoe would be removed. These trees have poor growth rates and potential for infecting the understory with mistletoe is high. These stands would have fewer remaining overstory trees than in those stands that are thinned (HTH). The understory would contribute considerably to future growth.

[24] The management zone is a benchmark with upper and lower limits that essentially define when competition with other trees presents as mortality. The HTH prescriptions in the Rim-Paunina area target the lower end of the management zone in order to maximize the time frame density reduction is effective while ensuring that trees fully occupy a site.

***Group Selections (HSG) for Alternative D***

Areas of high mistletoe occurrence and severe infection from dwarf mistletoe are proposed for this treatment. Within a stand, two to five acre openings would be created totaling 15-30 percent of the total stand area to prevent reinfection of dwarf mistletoe from above. In these openings, all trees regardless of size and with visible infection would be removed. The remainder of the stand would be thinned similar to HTH. Ponderosa pine seedlings would be the preferred tree species that would be planted to facilitate future replacement of the stand.

***Alternate Mistletoe Treatments (AltMist) for Alternative E***

These are alternative prescriptions to treat severely infected stands where all dwarf mistletoe-infected trees less than 21 inches would be removed. Mortality of the remaining infected trees 21 inches and above may be accelerated using techniques such as prescribed fire, topping, or blasting to create "openings" to prevent reinfection of dwarf mistletoe from above. All trees 21 inches and larger where mortality was induced by alternative methods would be retained onsite. Then the "openings" would be planted with ecologically appropriate trees species, primarily ponderosa pine. Where live infected ponderosa pine remain, alternate species would be planted within 30 feet of the infected tree's dripline to prevent reinfection of the understory. Generally, dwarf mistletoe is not transmitted between tree species.

***Aspen Treatments for all action alternatives***

Unit 621 is proposed for aspen treatment in all action alternatives. This is a 43 acre unit containing two small draws which, under a historical fire regime, would have had a greater hardwood component. The current condition of dense conifers has resulted in existing aspen and other hardwoods being crowded out as well as hardwood regeneration being suppressed. Treatment would consist of creating five openings of up to two acres in size, where all conifers less than 21 inches in diameter would be removed, which would facilitate the restoration of native species such as aspen and willow. Two of the openings would be located adjacent to an existing aspen patch toward the north end of the unit in order to allow it to expand. Additional openings would be placed within small draws that have a moist micro climate suitable to these species. Regeneration may also be assisted through a variety of means including prescribed fire, root cutting, or planting. Seedlings and saplings would be protected using wood, metal, or plastic fences until the crown is above the area susceptible to browse from large ungulates. Trapping of gophers may also be required. The remaining portion of the unit would be thinned following the HTH treatment guidelines.

**Direct and Indirect Effects Associated with the Action Alternatives**

***Bark Beetle Risk***

Figure 25 shows an approximate 25 percent reduction in the area at risk of bark beetle outbreak between all action alternatives and the no action alternative. This is due to the similar acres and treatments that reduce density in the action alternatives. With the reduction, more large trees are expected to remain on the landscape and in turn increase the area of expected LOS over time in all action alternatives compared to the no action.

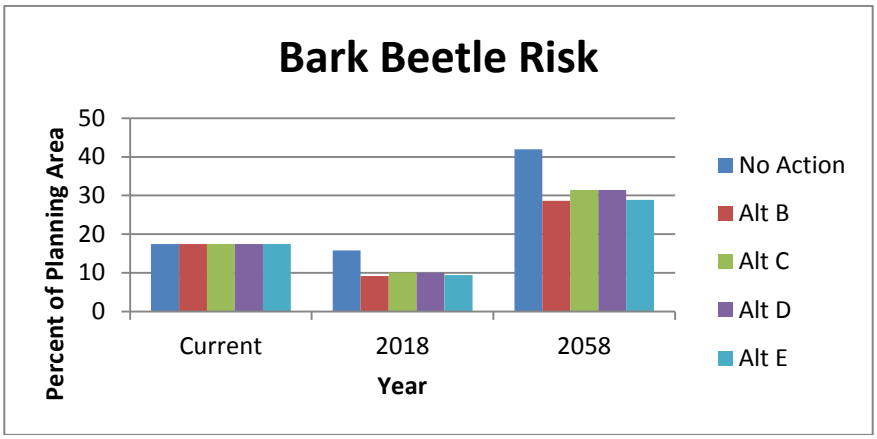



**Figure 25. Comparison of Bark Beetle Risk Between No Action Alternative and Alternatives B-E**

**Projected Structure, Composition, and HRV for Lodgepole Pine for All Alternatives**
Figure 26 and Figure 27 depict lodgepole pine structure and composition for all alternatives through time. It remains largely within its HRV for all alternatives. The largest size class is above HRV, but contributing to that is likely ponderosa pine which may be a minor component of the stands.

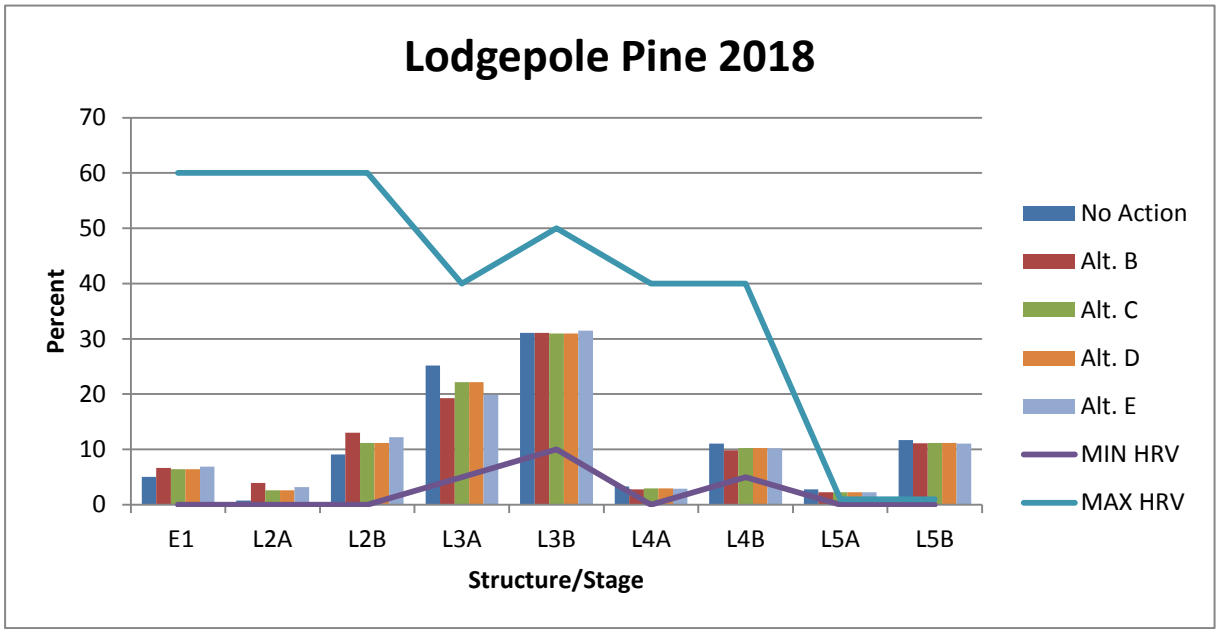



**Figure 26. Projection of Structure and Composition for Lodgepole Pine in Year 2018 for All Alternatives**

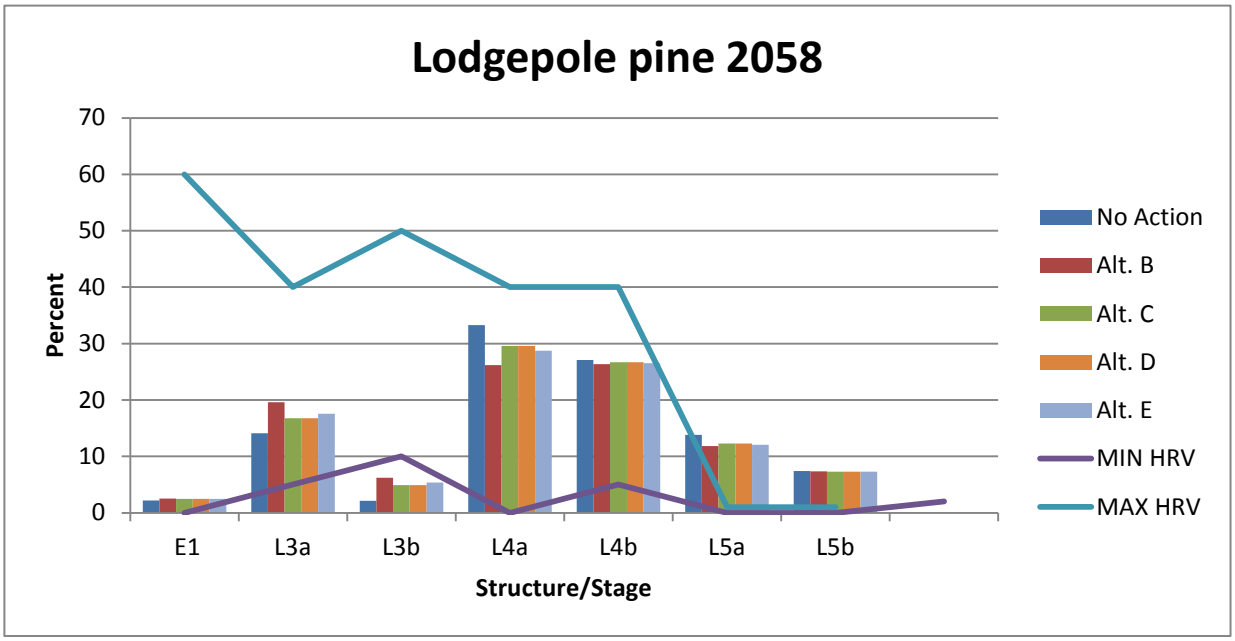



**Figure 27. Projection of Structure and Composition for Lodgepole Pine in Year 2058 for All Alternatives**

**Projected Structure, Composition, and HRV for Ponderosa Pine for All Alternatives**

Figure 28 and Figure 30 depict ponderosa pine structure and composition for all alternatives through time. Figure 29 shows progress from active management in moving from closed to open stands in LOS, as well as improvement in the total by year 2018 as compared to the current condition (Figure 21). Notice in Figure 28 the action alternatives begin to shift from an over abundance of closed/multistory structure to more open/single story structure (L5a to L5b and M5a to M5b) in year 2018. However, Figure 31 shows that by year 2058 the progress of shifting from more dense to more open stands having grown much slower, or stalled. This is due to a dynamic stand condition modeled without disturbance processes such as mechanical thinning or implementation of a frequent, low-intensity fire regime. In reality, the action alternatives begin the process of establishing an 8-15 year interval for a low-intensity/frequent fire regime. This would likely contribute to less dense stand conditions in a stand by year 2058.

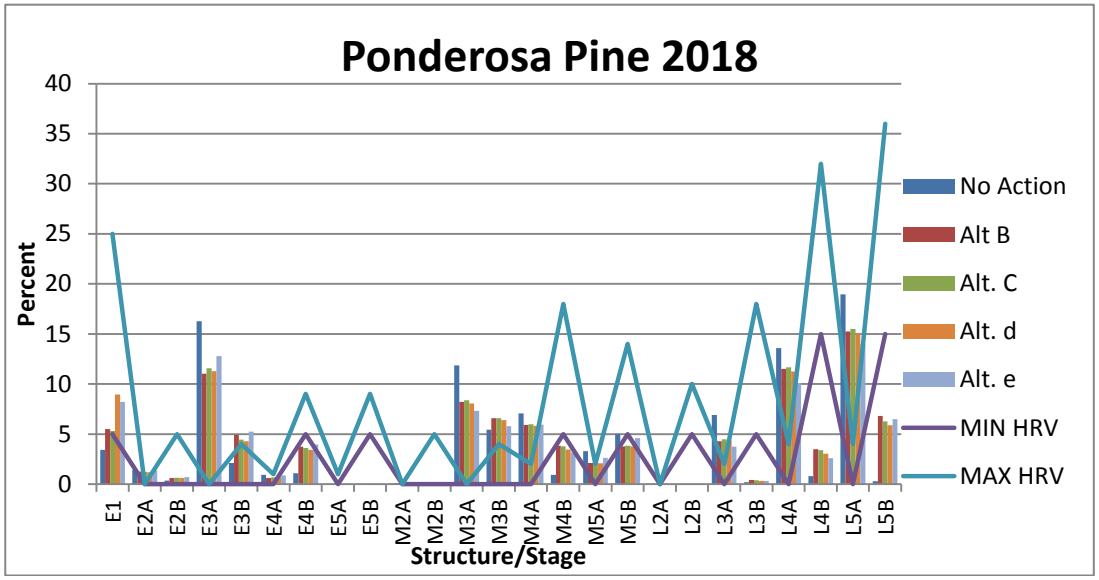



**Figure 28. Projection of Structure and Composition for Ponderosa Pine in Year 2018 for All Alternatives**

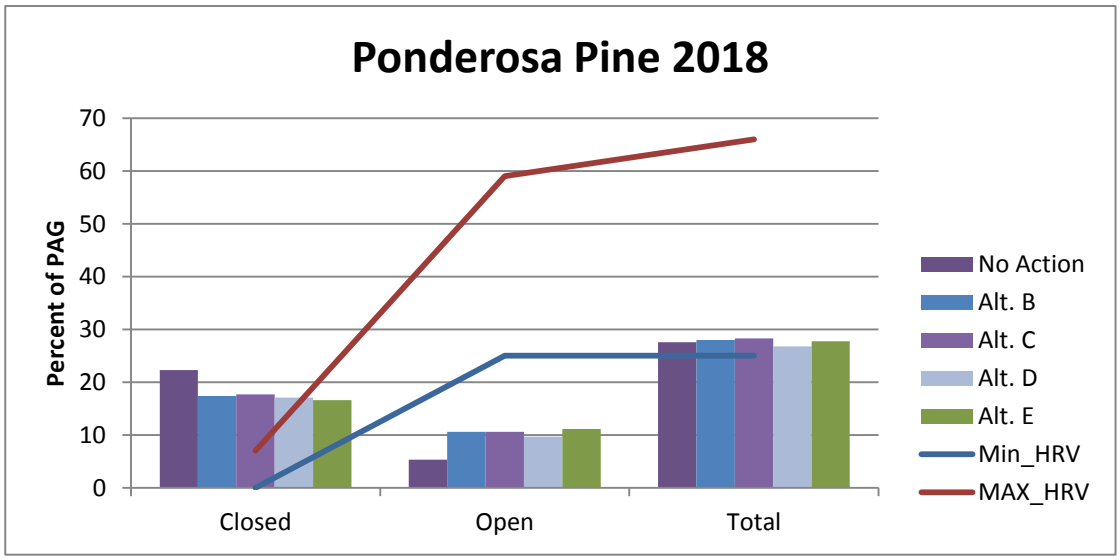



**Figure 29. Ponderosa Pine LOS in Year 2018 for All Alternatives**

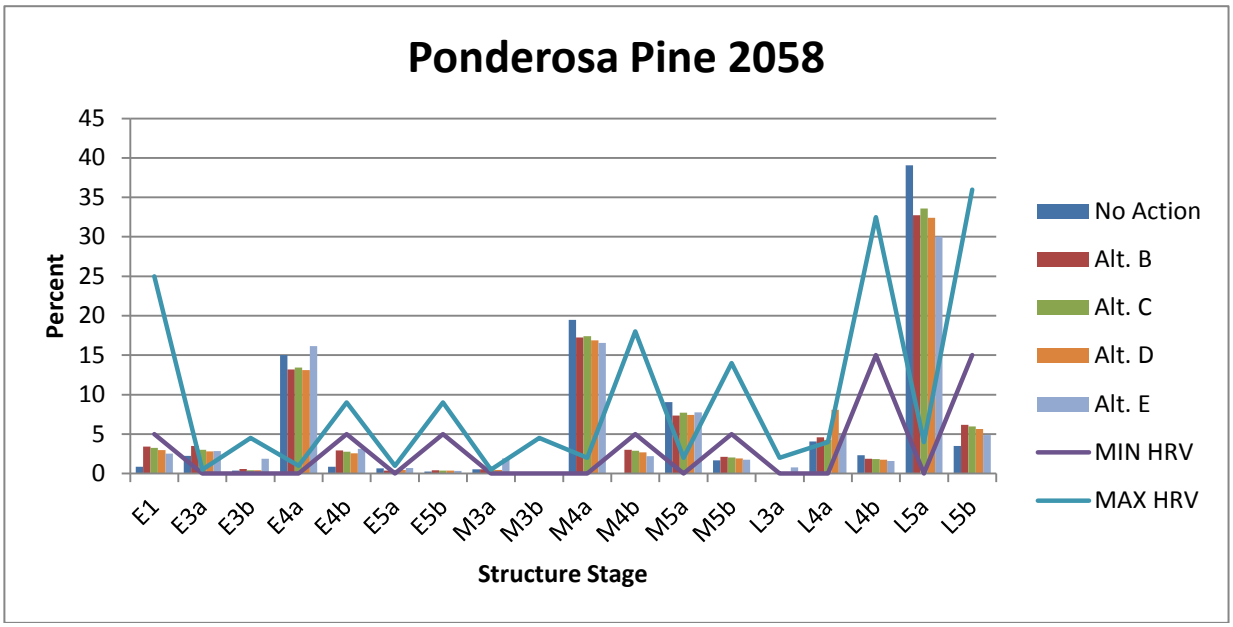



**Figure 30. Projection of Structure and Composition for Ponderosa Pine in Year 2058 for All Alternatives**

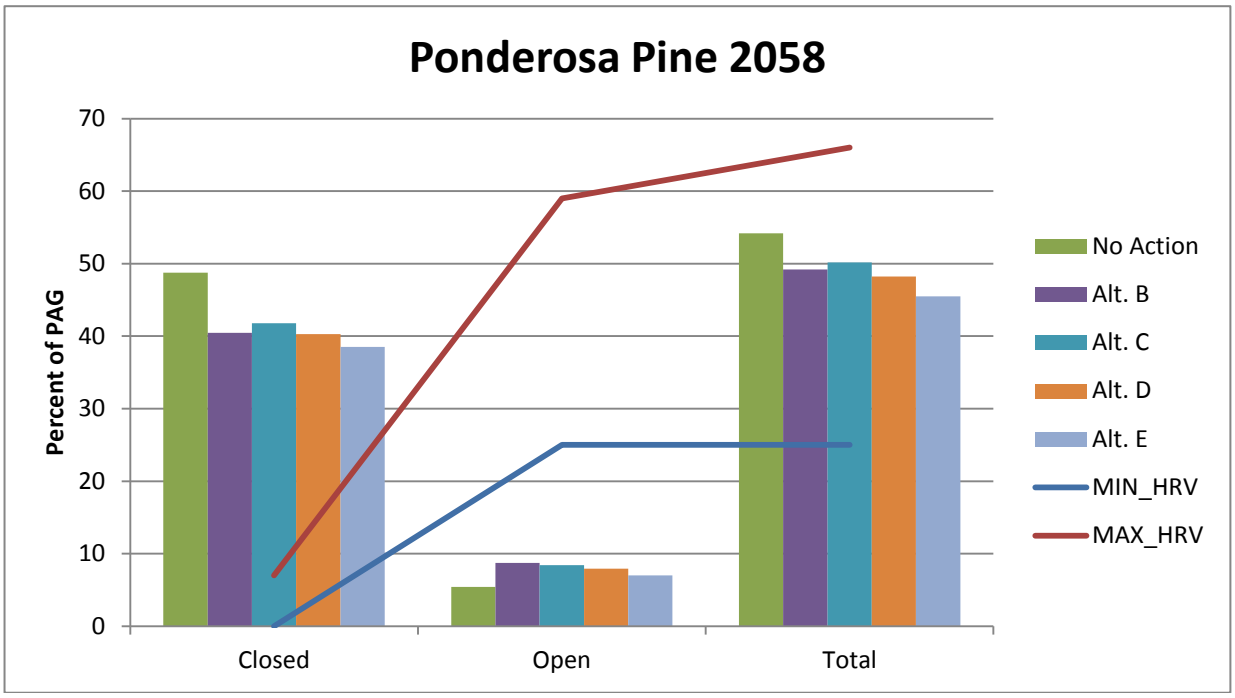



**Figure 31. Ponderosa Pine LOS in Year 2058 for All Alternatives**

**Mixed Conifer (Dry) Changes over Time for All Alternatives**

Figure 32 and Figure 34 depict the mixed conifer (dry) plant association structure for all alternatives and composition through time. Notice the figures show a more varied pattern of departure from HRV than the ponderosa pine. Due to the relatively small amount of activity planned in this plant association, there are few effects to discuss at a landscape scale. Reference the Fire and Fuels Management section for additional detail regarding benefits associated with small diameter thinning in Mixed Conifer (Dry) stands along Walker Rim.

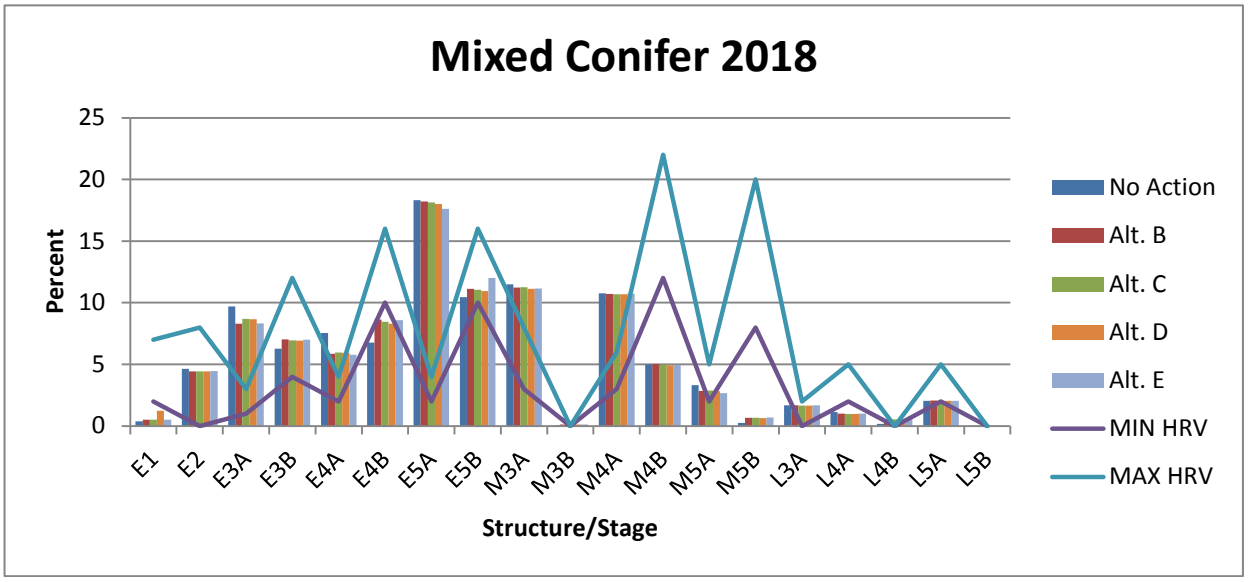



**Figure 32. Projection of Structure and Composition for Mixed Conifer (Dry) in Year 2018 for All Alternatives**

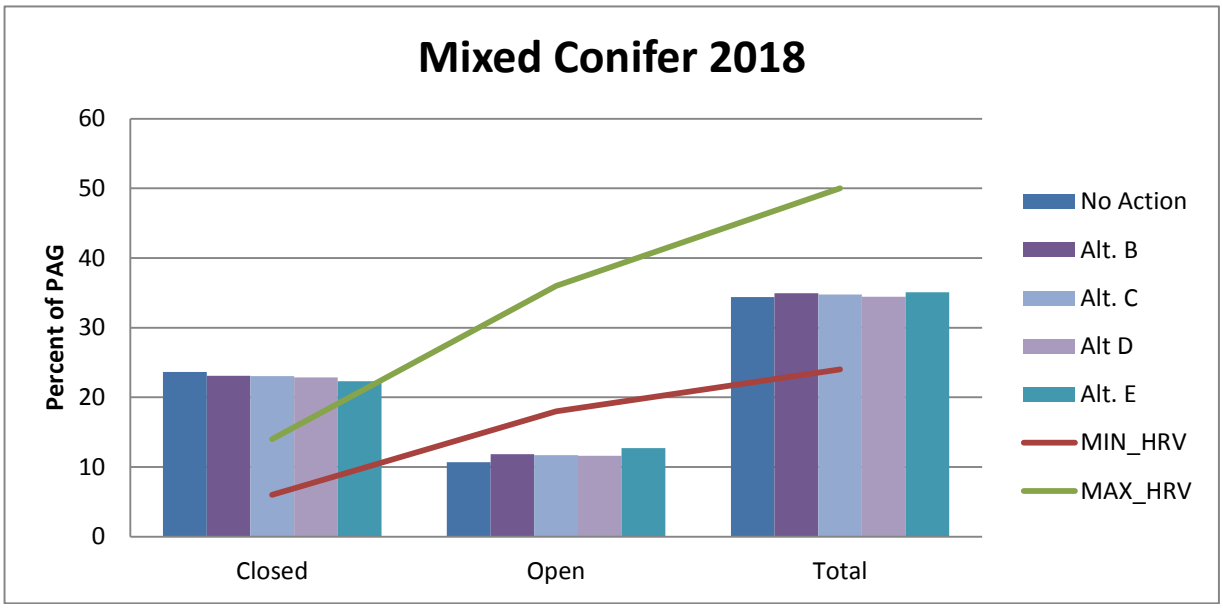



**Figure 33. Mixed Conifer (Dry) LOS in Year 2018 for All Alternatives**

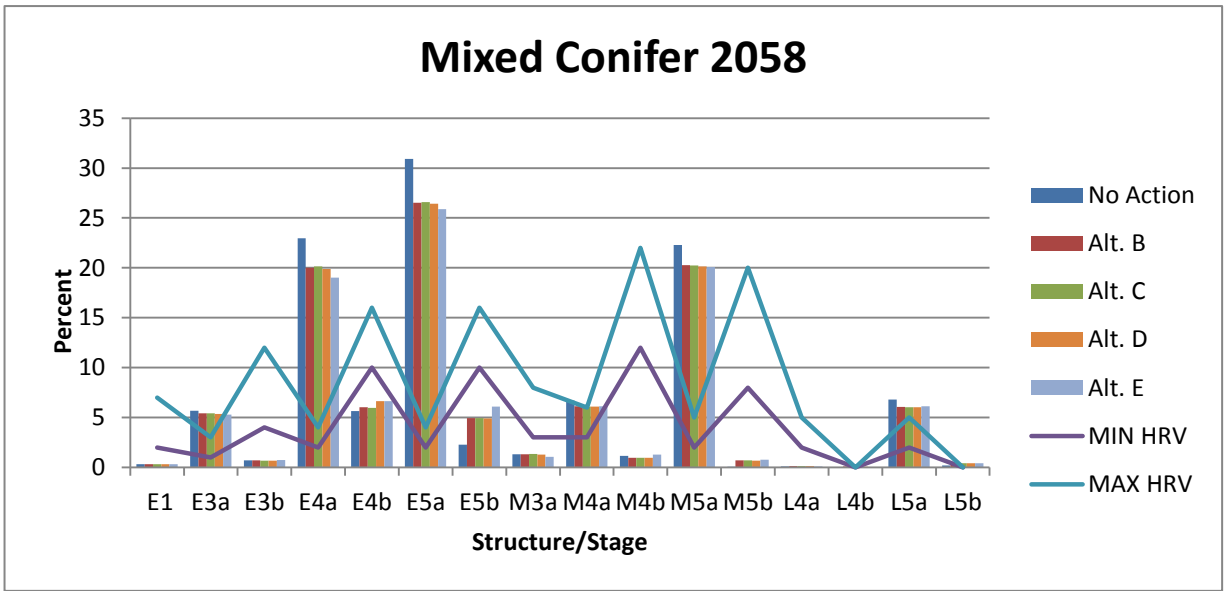



**Figure 34. Projection of Structure and Composition for Mixed Conifer (Dry) in Year 2058 for All Alternatives**

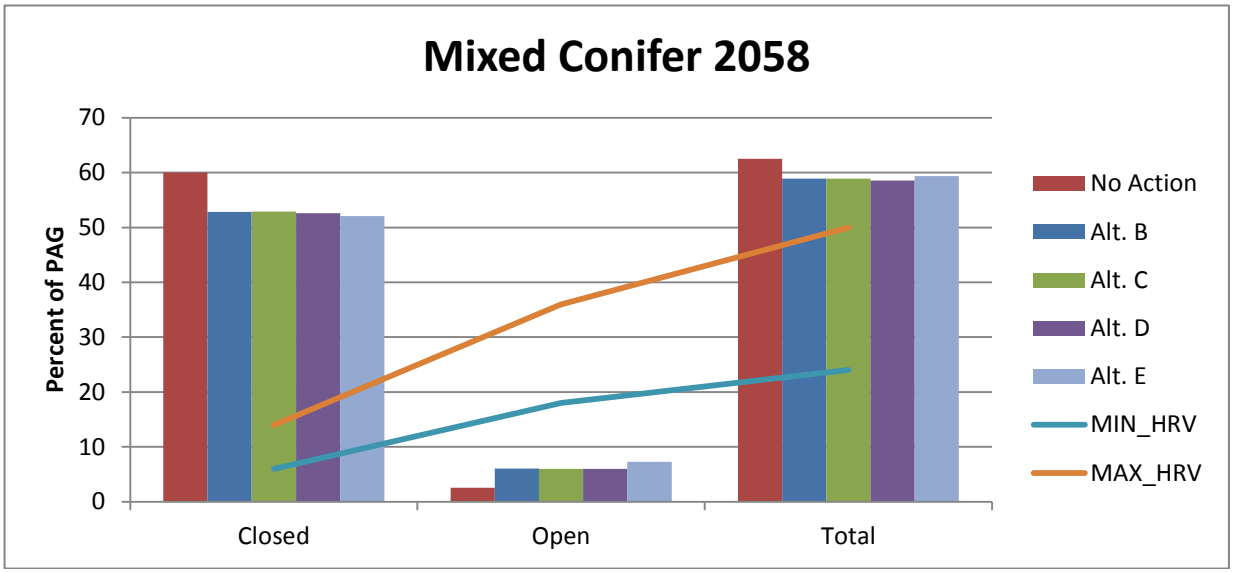



**Figure 35. Mixed Conifer (Dry) LOS in Year 2058 for All Alternatives**

## Key Issue #2 Related to Forest Disease – Western Dwarf Mistletoe

Both Western dwarf mistletoe (WDM) (*Arceuthobium campylopodum*), which occurs in ponderosa pine (*Pinus ponderosa*), and Lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) are prevalent diseases in the Rim-Paunina project area. Lodgepole pine dwarf mistletoe is proposed to be treated with vegetative prescriptions (HIM and HTH) to control its abundance. However, the focus of this section is to display the effects of mistletoe-related treatments in ponderosa pine as it is related to Key Issue #2 to address a diminishing large tree component in the project area. Field surveys within the project area revealed that Western dwarf mistletoe, when present, was in all size classes and throughout the tree crowns (2010 survey data in Table 77 and Table 78).

Initial walk through surveys in the Rim-Paunina Project area identified approximately 5,600 acres where dwarf mistletoe in ponderosa pine could impede development or maintenance of LOS. This included 3,000 acres on Walker Rim (Figure 38). Because of the steepness of the terrain and the necessity for advanced harvest systems, these acres were deferred from further assessment. A gridded survey was then conducted on the areas of the concern along the Rim which refined the area proposed for focused mistletoe control in Alternative E to approximately 1,900 acres. This was followed by more detailed information gathering on a random subset of the grid survey points. Plots were placed on a subset of 11 stands with 55 plots. Tree information (including dwarf mistletoe rating) was gathered at each plot. Average trees per acre per size class and dwarf mistletoe rating was then determined from this data.

**Background**

Ponderosa pine infected with WDM exhibits reduced volume and height growth (Hawksworth 1996; Maffei and Jacobi 1986), reduced viable seed set and cone production (Hawksworth 1996), increased susceptibility to fire caused mortality (Conklin and Geils 2008), and increased susceptibility to successful western and mountain pine beetle attack (Miller and Keen 1960; Eglitis 2010, personal communication). These effects are proportional to increasing levels of infection. A stand heavily infected with dwarf mistletoe has a decreased likelihood of developing into Late and Old Structure (Hopkins 1992). Outbreaks of mountain pine beetle may increase the proportion of infected trees by killing the uninfected trees and increasing the rate of spread of mistletoe. Thus, management objectives for both beetles and dwarf mistletoes need to be taken into account (Edmonds, Agee, and Gara 2011).

Dwarf mistletoes possess one of the most effective hydrostatically controlled, explosive mechanisms of seed dispersal known to flowering plants (Hawksworth, USDA Agricultural Handbook 709, 1996). Maximum dispersal distance is about 48 feet, but dispersal distances of 30 feet or less are more typical. Studies of three species of dwarf mistletoes have indicated about 40 percent of dispersed seeds are intercepted by trees (Hawksworth 1965b; Smith 1985). For example, an adjoining tree within 18 to 27 feet of an infected host would intercept 90 percent of the seeds dispersed in its direction. Germination is largely determined by environmental factors, but most temperate species germinate in the spring following fall dispersal. Once infection is established, an incubation period of two to five years elapses before young shoots appear and the cycle of infection continues. In single-storied stands, spread is estimated to be two to three feet per year. Spread in multi-storied stands (which is largely the stand structure in the Rim-Paunina area) is more rapid because the understory trees are exposed to infection from the overstory (Forest Insect and Disease Leaflet, USDA 2003).

> Large infected trees perpetuate infection and reduce success of sanitation attempts. Regenerating trees that soon become infected, then mature under a canopy of infected overstory trees, would not likely contribute to LOS of large diameter trees (USDA PNW BMZ-96-07, 1996).

It is believed that incidence of dwarf mistletoe is elevated from historical conditions within the project area. Frequent, low-intensity fire played a large role in moderating its presence. These fires reduced tree

density and severely infected trees were more likely to torch with subsequent mortality. This created gaps where mistletoe spread between trees was unlikely. In this region, fire plays an important role in the development of dwarf mistletoes, especially in pine forests. The historically frequent low-intensity fires here killed small infected trees and reduced the rate of spread. Fire suppression has caused increased infection in these stands and the incidence of infection is now much higher than natural levels (Edmonds, Agee, and Gara 2011). However, due to the rarity of stand replacing events, mistletoe was seldom eliminated from stands (Hessburg et al. 1994). Before fire suppression, associated with a fire exclusion policy, low-intensity fire killed many of the infected small trees (Hessburg et al. 2008). Prior management practices beyond fire exclusion may have also played a role in increasing the rate of infection. Early harvest practices emphasized removal of mature, large diameter ponderosa pine which were at high risk of attack by western pine beetle. Smaller, understory trees were often retained. Where fire would have killed many of those that were infected with western dwarf mistletoe, they now would remain and languish (Znerold 1989). Adding to the mechanism for infection, an emphasis on retention of large trees with uneven-aged management prescriptions plus the implementation of the Revised Continuation of Interim Management Direction Establishing Riparian Ecosystem and Wildlife Standards for Timber Sales (Eastside Screens), created ideal stand conditions where young understory trees would become rapidly infected due to their position in the canopy.

Severity of infection from dwarf mistletoe is measured with a Dwarf Mistletoe Rating (DMR) scale from 1 (light) to 6 (severe). Individual trees with a DMR of 3 or less and stands with an average rating of less than or equal to 2 have a higher likelihood of being effectively managed through thinning treatments and attaining Late and Old Structure (LOS). Figure 36 illustrates how to assess the severity of infection using visible infections in the crown (Hawksworth 1977).

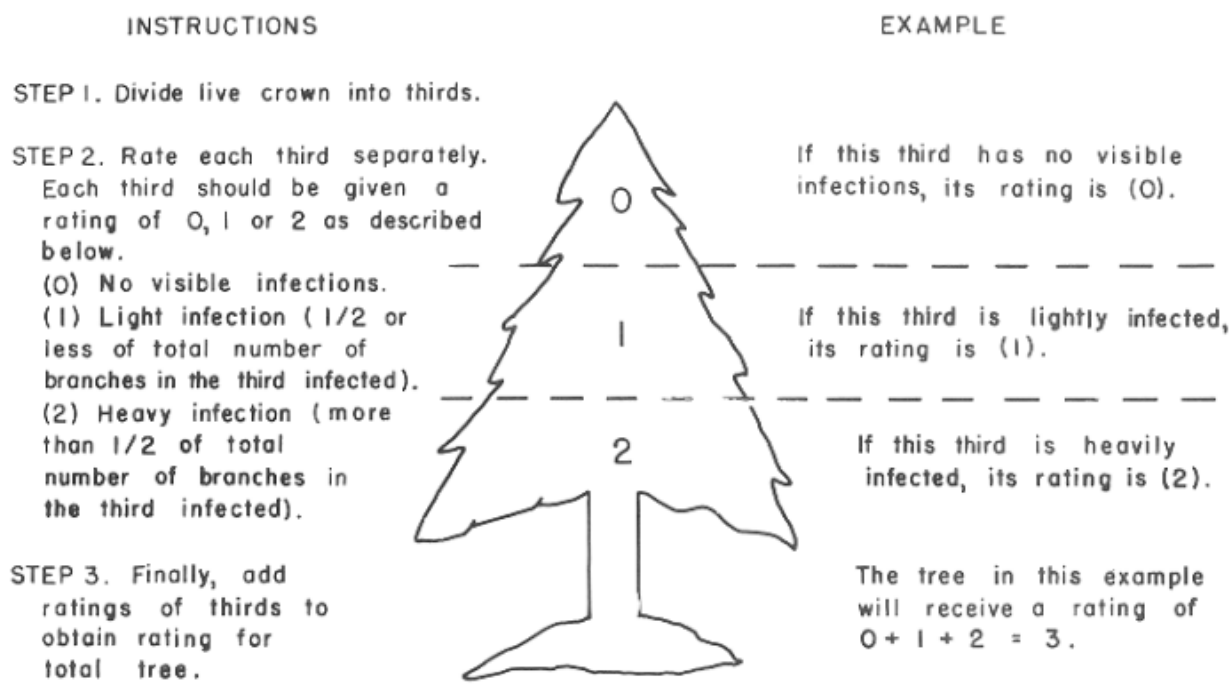



**Figure 36. Determining Dwarf Mistletoe Ratings (DMR) using the 6-class Dwarf Mistletoe Rating System**

To treat light to moderate mistletoe infections in the project area, Alternatives B through E propose commercial thinning (HTH) in ponderosa pine stands. Roth and Barrett (1985) investigated the response after thinning ponderosa pine in central Oregon. Dependent upon the site potential of the stand, they

found that if crowns enlarged at a faster rate than dwarf mistletoe propagates, thinned trees would grow quite productively. They found that while the population of dwarf mistletoe plants increases dramatically following thinning, it does so at about the same rate as the increase in the size of the tree crown. The ratio of number of plants to crown size stays relatively constant. The net result was no detectable height growth in an even-aged stand. Barrett and Roth (1986) also investigated the response of a thinned stand of mistletoe-infected immature 40- to 70-year old ponderosa pine, and response of a thinned stand of mistletoe-infected immature ponderosa pine that had recently had a removal of mature mistletoe-infected overstory. Conclusions of these studies demonstrate that by regulating stand density, trees in even-aged stands are able to tolerate light to medium levels of dwarf mistletoe and grow at or near rates of uninfected trees.

However, in uneven-aged stands with numerous scattered infections, conditions undoubtedly deteriorate over time (USDA PNW BMZ-96-07, 1996). Dwarf mistletoe is most apt to spread, intensify, and cause damage under uneven-aged conditions. Where infection severity renders stand conditions unmanageable, more aggressive stand-replacing harvests may be called for (Gill and Hawksworth 1954; Hadfield and Russell 1978; Hawksworth 1978). Given its persistent nature, the best way to control dwarf mistletoe is to prevent infection by protecting young tree regeneration (Conklin 2000). Prevention can mean stand replacement or clearcutting. Spot treatment for protecting regeneration in irregular, uneven-aged sites can help provide a more sustainable condition by reducing or delaying infection. As a regeneration method in uneven-aged management, group selection intuitively provides better mistletoe control than single-tree selection, since the regeneration occurs in openings rather than directly beside infected trees. Treatment blocks should include groups of infected trees and a buffer of 100 feet beyond visibly infected trees. To minimize invasion of young pine stands by dwarf mistletoe from bordering infected trees, the ratio of perimeter to area of clearcuts should be as low as possible. That is, cut openings should be roughly circular and not long, narrow strips (Forest Insect and Disease Leaflet, USDA 2003). Two- to four-acre gaps in heavily infected uneven-aged stands are the recommended size to allow ponderosa pine regeneration to be free to grow in a relatively infection-free environment[25].

Table 75 and Table 76 illustrate findings from a 1990 Hawksworth Study ("*How Long Do Mistletoe-Infected Ponderosa Pine Live?*") on the relationship of tree growth and mortality in Arizona ponderosa pine to dwarf mistletoe infection. In the study, Dwarf Mistletoe Rating (DMR) was tracked by diameter class over a 30 year period. From the data in the tables, notice that the mean dwarf mistletoe rating increases faster for trees under nine inches than for those over nine inches. Also, those trees under nine inches with a DMR of 5 or 6 did not survive 30 years (Table 75).

Retained in a passive management scenario without a frequent fire regime, dwarf mistletoe severity increases within the stand and it spreads laterally to uninfected areas of the stand at a rate of one to two feet per year (Hawksworth 1996). This relationship is magnified for stands with a considerable uneven-aged structure and a large tree component. These effects are intensified, or more pronounced when the overstory trees are infected, causing not only a lateral, but also a vertical vector for spreading infection onto susceptible understory trees. Infected overstory trees are less likely to develop into mature trees as shown in Table 76, especially if the level of infection is severe (rated 5 or 6). Severe infection levels also serve as ladder fuel (facilitating transition from a low-intensity ground fire into a more lethal crown fire event), reduce the vigor of the older trees through competition, and make them more susceptible to attack from western and mountain pine beetle. These factors taken together reduce the potential for a stand to achieve LOS in the portion of the stand where the overstory infection occurs.

[25] Conversation with Hessburg at the Dry forest Workshop: Creating Stand-Level Prescriptions to Integrate Ecological & Fuel Management Objectives for Dry Forests of the Eastern Cascade Range, 2009.

**Table 75. Trees/acre of Ponderosa Pines and 32-year Intensification in Relation to Original Dwarf Mistletoe Infection Rating Class and Diameter (from Hawksworth, 1990 on Arizona Ponderosa Pine)**

| Tree Diameter | | | | |
|---|---|---|---|---|
| | Under 9 Inches in Diameter | | 9 inch Diameter and Over | |
| 1950 DMR Class | Trees/acre Alive in 1982 | Mean DMR in 1982 | Trees/acre Alive in 1982 | Mean DMR in 1982 |
| 0 | 88 | 1.8 | 199 | 1.1 |
| 1 | 19 | 4.3 | 53 | 3.7 |
| 2 | 14 | 5.1 | 40 | 4.9 |
| 3 | 4 | 5.5 | 25 | 5.2 |
| 4 | 2 | 6.0 | 16 | 5.4 |
| 5 | 0 | - | 15 | 5.8 |
| 6 | 0 | - | 3 | 6.0 |

**Table 76. Trees/acre of Ponderosa Pines and Percent Survival after 11, 20, and 32 years in Relation to Original Dwarf Mistletoe Infection Rating Class and Diameter (from Hawksworth, 1990 on Arizona Ponderosa Pine)**

| Tree Diameter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Under 9 Inches in Diameter | | | | 9 Inches Diameter and Over | | | |
| 1950 DMR Class | Trees/acre Alive in 1982 | Percent Alive | | | Trees/acre Alive in 1982 | Percent Alive | | |
| | | 1961 | 1970 | 1982 | | 1961 | 1970 | 1982 |
| **0-1** | **119** | **99** | **97** | **90** | **259** | **98** | **98** | **97** |
| **2-3** | **42** | **90** | **81** | **43** | **78** | **91** | **90** | **83** |
| **4-5** | **15** | **60** | **40** | **13** | **93** | **82** | **63** | **33** |
| **6** | **6** | **16** | **16** | **0** | **58** | **48** | **36** | **5** |

Figure 37 illustrates growth of trees correlated to the dwarf mistletoe rating over the course of 100 years. (Growth rates from Hawksworth, USDA Agricultural Handbook 709, 1996). An assumed linear growth rate of an uninfected tree that takes 100 years to reach 21 inches is compared to expected growth rates of differing DMR severity. Dwarf mistletoe not only reduces the number of trees that reach 21 inches but also increases the time for individual trees to reach that size.

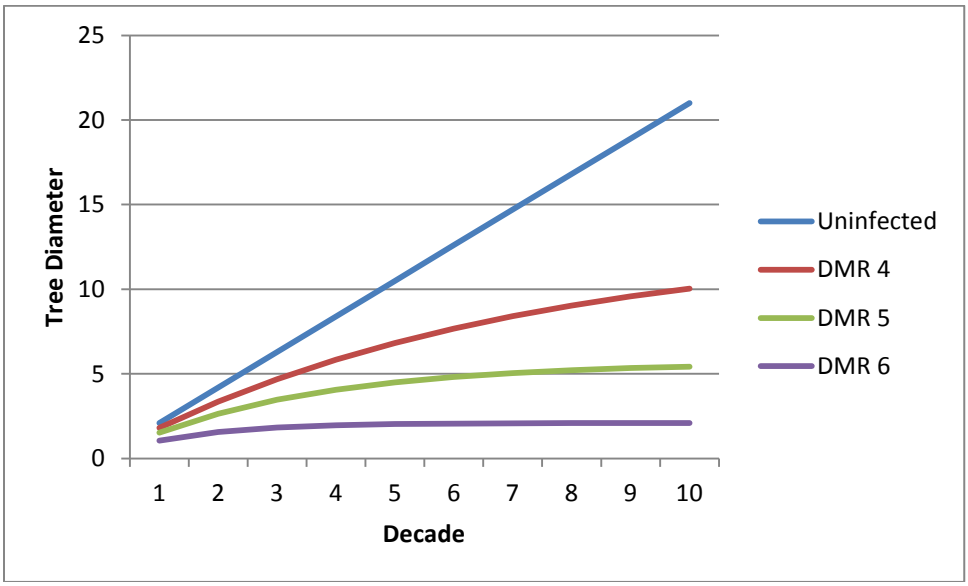



**Figure 37. Relative Growth of Ponderosa Pine of Differing Dwarf Mistletoe Infection Ratings**

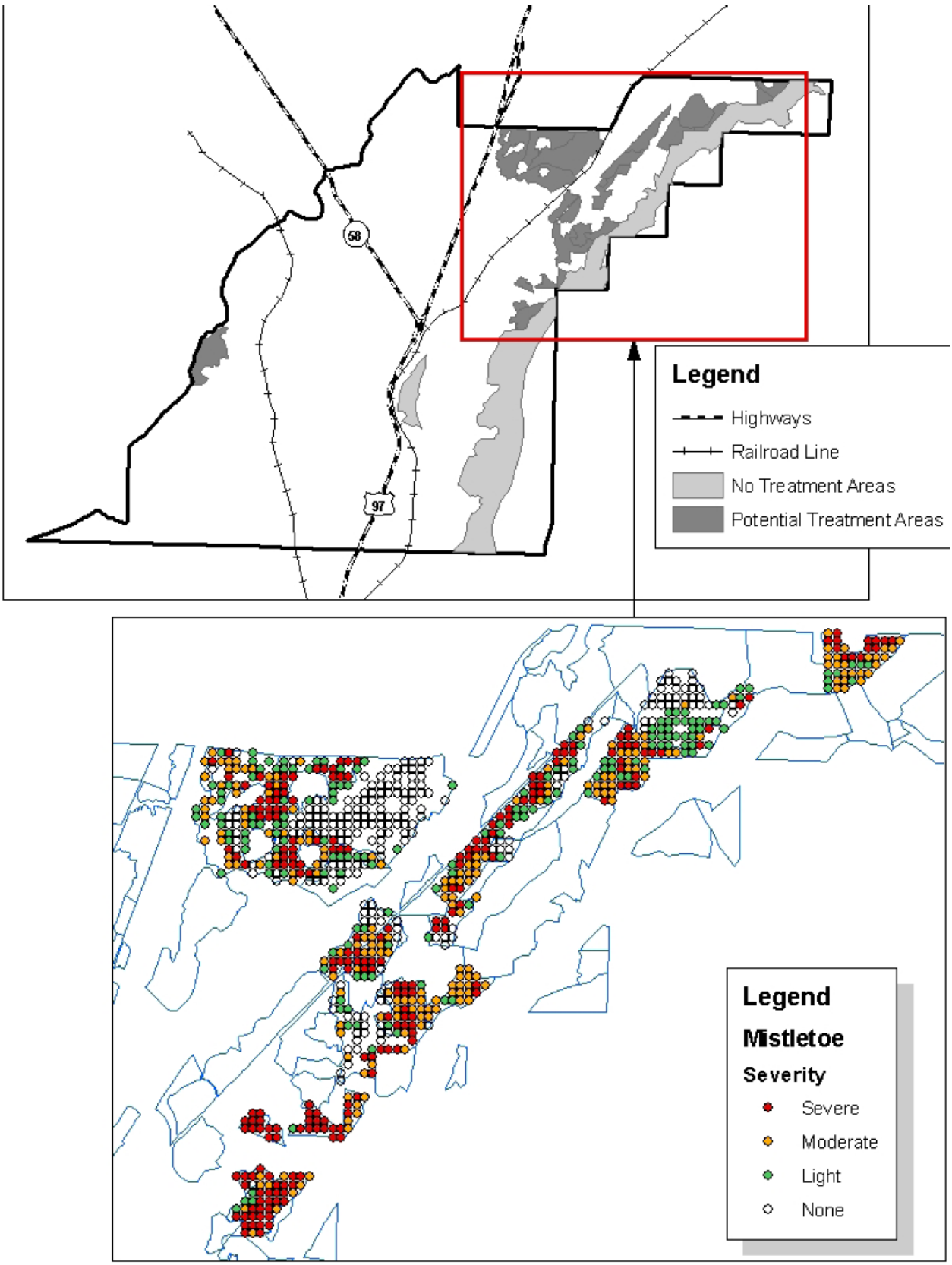



**Figure 38. Surveyed Dwarf Mistletoe Presence and Severity in the Rim-Paunina Project**

## Direct and Indirect Effects

### Alternative A

Under Alternative A, the progression of dwarf mistletoe in infected stands would continue and likely spread to currently uninfected stands. Infected stands would continue to have increased susceptibility to western and mountain pine beetle due to reduced vigor induced by dwarf mistletoe.

Using the 1990 Hawksworth research and the dwarf mistletoe rating, predicted growth and mortality rates over time were extrapolated for surveyed trees in the Rim-Paunina project area. Table 77 shows the number of ponderosa pine trees 21 inches and larger in the survey areas with predicted survival; notice the mortality rate of large trees with a dwarf mistletoe rating of 4 to 6. The loss of these trees would mean a decrease in LOS conditions.

**Table 77. Predicted Survival of Surveyed Ponderosa Pine Trees 21 Inches and Greater with Dwarf Mistletoe by DMR Rating in the Rim-Paunina Project Area**

| Year | Dwarf Mistletoe Rating | | | |
|---|---|---|---|---|
| | 0-1 | 2-3 | 4-5 | 6 |
| 2010 | 5,327 | 4,293 | 2,660 | 1,140 |
| 2020 | 5,220 | 3,907 | 2,181 | 547 |
| 2030 | 5,220 | 3,863 | 1,676 | 410 |
| 2040 | 5,167 | 3,563 | 878 | 57 |

Table 78 displays trees per acre from surveys in the Rim-Paunina area by size class and predicted mortality. Within the nine to 21 inch size class, notice the mortality rate of trees in the higher dwarf mistletoe ratings; approximately two out of five would not survive to the third decade. These are the trees that would be in line to replace the large trees (21 inches or greater) in the near term and provide LOS conditions. Trees measuring nine inches and under are the most vulnerable to mistletoe infection, are the most likely to be infected from the overstory, and are trees that are important for achieving sizes of 21 inches and over in the long term.

**Table 78. Mistletoe-infected Ponderosa Pine Predicted Survival by DMR and Size Class in the Rim-Paunina Project Area**

| Tree Diameter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Under 9 Inches in Diameter | | | | 9-21 Inches Diameter and Over | | | |
| DMR Class | Trees/ acre Alive in 2010 | Number Predicted Alive | | | Trees/ acre Alive in 2010 | Number Predicted Alive | | |
| | | 2020 | 2030 | 2040 | | 2020 | 2030 | 2040 |
| **0-1** | 137 | 136 | 133 | 123 | 17 | 17 | 17 | 16 |
| **2-3** | 27 | 24 | 22 | 12 | 9 | 8 | 8 | 7 |
| **4-5** | 53 | 32 | 21 | 7 | 12 | 10 | 8 | 4 |
| **6** | 6 | 1 | 1 | 0 | 3 | 1 | 1 | 0 |

### Alternatives B and C

Alternatives B and C would reduce the density of Ponderosa Pine on 2,593 acres of severely infected stands using commercial thinning (HTH) without removing any trees over 21 inches. Trees with moderate to high mistletoe rating would be preferentially removed but many infected trees would remain resulting in a rating of "moderate" effectiveness in comparison to the other action alternatives. None of the action alternatives would improve the mortality rate of the infected trees 21 inches and greater. Although density reduction would have the potential to increase available resources such as sunlight and water (and thus a slight improvement in prolonging mortality), for the larger trees the effect would be so small that the difference between alternatives is not meaningful. Similarly, although small diameter

thinning and prescribed burning would have some tangible benefits on 3,000 acres of infected stands on Walker Rim for reducing risk associated with an unwanted wildfire event, it would not appreciably change the growth or mortality rate of infected stands.

Barrett and Roth (1986) found that by regulating stand density, trees in even-aged stands are able to tolerate light to medium levels of dwarf mistletoe and grow at or near rates of uninfected trees. Although the site potential of the Barrett and Roth study in central Oregon was likely more productive than areas selected for treatment in the Rim-Paunina area, there would be benefits to thinning in Alternatives B and C. In light to moderately infected stands the results may not release the trees to grow at or near uninfected rates, but it would slow down the progression of infection and somewhat maintain achievement and recruitment of LOS. In the most severely infected stands, thinning would delay the inevitable loss of LOS on approximately 2,593 acres. Uneven-aged stands found in the Rim-Paunina area as opposed to the even-aged conditions found in the Barrett and Roth study would also temper expected results.

**Alternative D**

Alternative D would use a group selection (HSG) prescription to address 2,593 acres of mistletoe infection. Under the HSG prescription, two to five acre openings would be placed in the most effective places where sources of reinfection, as well as the number of trees 21 inches and over to be cut, are both minimized. Ponderosa pine seedlings would then be planted in a relative mistletoe-free environment. This would occur on approximately 30 percent of infected stands, or 778 acres. The remaining ‘light’ to ‘moderate’ infected stands (1,815 acres), would be treated using an HTH prescription similar to Alternatives B and C. Alternative D responds to Key Issue #2 by focusing on the long term for white-headed woodpecker habitat. While Alternatives A, B, and C do not adequately address the potential gap-in-time that can span decades before larger trees are available in severely infected areas, Alternative D would shorten this gap by breaking the cycle of infection in the most severely infected areas. The effectiveness for this strategy is categorized as “high”.

**Alternative E**

Alternative E responds to Key Issue #2 by taking a different approach to the most heavily-infected mistletoe stands than Alternative D. All infected trees less than 21 inches would be removed and an ecologically appropriate non-host species would be planted within the infection radius of the remaining infected trees over 21 inches to prevent spread. This would be accomplished on approximately 1,920 of the most seriously infected acres, which were determined during field survey in 2010. To minimize the continued cycle of mistletoe “raining” down from remaining infected trees 21 inches and greater, several techniques could be used to hasten their mortality and providing recruitment for snags. Depending on site specific appropriateness, prescribed fire or other methods such as mechanical shearing or blasting could be used. An additional 586 acres of ‘light’ to ‘moderate’ infected stands would be treated using an HTH prescription similar to Alternatives B and C.

The effectiveness for this strategy is categorized as “high”. Table 79 summarizes the composite ranking of dwarf mistletoe treatment effectiveness, by alternative, with a ranking of 1 indicating the most effective alternative.

**Table 79. Composite Ranking of Dwarf Mistletoe Treatment Effectiveness by Alternative**

| Alternative | Vegetative Prescription | Acres treated | Effectiveness | Composite Ranking |
|---|---|---|---|---|
| B | Commercial Thinning (HTH) | 2,593 | Moderate | 3 |
| C | Commercial Thinning (HTH) | 2,593 | Moderate | 3 |
| D | Group selections (HSG) | 778 | High | 2 |
| | Commercial Thinning (HTH) | 1,815 | Moderate | |
| E | Alternative Mistletoe Treatment (AltMist) | 1,920 | High | 1 |
| | Commercial Thinning (HTH) | 586 | Moderate | |

**Cumulative Effects**

Past timber harvests of various forms and fire exclusion have affected forested vegetation in the Rim-Paunina area. Meanwhile, tree growth, ecological succession, disturbance, and other processes have continued to act upon the landscape. Over time this has made it impossible to separate out the specific effects of any one event. The total of these effects is reflected in the current condition and it's relation to the Historic Range of Variability (HRV) and is further explained in the HRV part of this section.

No foreseeable future actions are expected to affect forested vegetation in any Rim-Paunina treatment units. The Crescent Ranger District annually authorizes a district-wide precommercial thinning program of roughly 500 acres/yr. Some as yet unimplemented thinning units from prior years overlap with the Rim-Paunina project area. In the event that a precommercial thinning unit overlaps with a Rim-Paunina treatment unit, management activities would only be conducted once, creating no cumulative effect on the ground.

## Fire and Fuels Management

The following is the specialist report provided in its entirety. Records of the modeling performed for this analysis are found in the administrative record at the Crescent Ranger District. The goal of fuels reduction activities is to reduce the undesired effects of a wildfire within the project area; which includes increasing fire suppression options with strategies and tactics to reduce risk to life, property, and important resources such as nesting habitat for the white-headed woodpecker. The goal is also to facilitate a low-intensity frequent fire regime in appropriate stands within the area, which is made up of one of the most contiguous large and fire resistant stands of ponderosa pine on the Ranger District.

The strategy within the Rim-Paunina area would be a landscape approach to strategically target stands with techniques to lower the fire behavior characteristics. This would be accomplished by vegetation manipulation of the entire fuels stratum which includes surface fuels, canopy base height, crown density, and shifting stand composition towards retention of fire resistant trees. This tactic to reduce the entire fuel stratum to achieve overall lower fire behavior characteristics is supported by Agee and Skinner (2005). An integrated vegetative prescription that reduces surface fuels, rearranges the continuity, and lowers flame lengths can reduce rates of spread. Coupled with elevation of the canopy base height and removal of ladder fuels, ground fires are more likely to remain on the forest floor and not transition to a much more lethal crown fire event. If a fire gets into the crowns of trees, it is a desired stand condition to limit the extent of the event to single trees and not a sustained and widespread episode. Reduction of the canopy bulk density or simply spacing the crowns of trees farther apart inhibits initiation of such an event (Agee 2002; Hessburg and Agee 2003).

Within areas that are indicated for active management, the specific fuels–related prescriptions include:

- **To reduce canopy bulk density and ladder fuels**, thin trees less than eight inches in diameter with a minimum spacing of 18 feet if no larger trees are present. This approximates 135 trees per acre of smaller diameter trees. Also, prune remaining trees to a maximum of eight feet canopy base height and/or retain at least a third of the crown.

- **To reduce surface fuel loading and break up fuel continuity,** several stages of hazard reduction activities would be completed with the end result of prescribed underburning in appropriate stands. First, removal and utilization of any available forest products such as post and pole material, firewood, or biomass would be encouraged in excess of down wood requirements. After utilization, piling by grapple on existing skid trails and landings would occur mostly in activity units where small diameter thinning occurs. One pass off existing skid trails is allowed in areas of high concentrations of slash. In visual corridors along Highways 58 and 97 and where brush reduction is required prior to introduction of prescribed underburning, slash mastication by low pressure and tracked machines would occur. Handpiling of activity-generated slash would occur on the rim units and steeper slopes where machinery is not desired. The final step would be careful application of prescribed underburning in appropriate stands which also favors retention of fire resistant species.

In units that are deficient in down woody material, slash would be lopped and scattered.

**Down Wood Requirements**

The intent is to retain all existing levels of down wood nine inches and greater in all Plant Association Groups[26]. Only activity-created slash below these diameters would be piled and utilized or disposed. The minimum pile size is 6 feet by 6 feet by 4 feet in handpile units. This requirement can be waived if site-specific monitoring determines adequate levels of down wood are met in all units regardless of location. While retaining down wood in place is preferred, it is recognized that some manipulation may be needed to meet stand prescription objectives. In all units, down wood may be manipulated (shifted, clumped, grouped, driven over, etc.) only as necessary to meet objectives. In all units, if sufficient size classes are not present, then the largest available down logs would be substituted.

**Walker Range Community Wildfire Protection Plan (CWPP)**

Signed in January of 2012, the Walker Range Fire Protection District Community Fire Plan in Northern Klamath County is a partnership between local, state, and federal agencies, community organizations, and individuals. It is used to identify wildfire risks, develop priorities for funding, and develop programs to reduce the risk of wildfires to citizens and communities in Northern Klamath County. These include communities and surrounding areas of the Crescent, Crescent-Odell Lakes, Chemult, Oregon Outback Rural Fire Protection Districts, and the Walker Range Fire Patrol Association. Although reducing the threat of wildland fire is the primary motivation behind this plan, managing the forests and rangelands for hazardous fuel reduction and fire resilience is only one part of the larger picture. Residents and visitors have said they want healthy, fire-resilient forests that provide habitat for wildlife, recreation opportunities, and scenic beauty (CWPP 2005).

The goals of the Walker Range Community Wildfire Protection Plan are to increase public understanding of living in a fire-adapted ecosystem, instill a sense of personal responsibility for taking preventative actions regarding wildland fire, restore fire-adapted ecosystems, and improve the landscape's fire resilience while protecting other social and ecological values. To achieve these goals, the plan includes the following objectives to assess the risk and hazard of wildland fire on all lands within the plan boundary: 1) identify priorities for fuel reduction projects; 2) examine emergency operations within the plan area and identify areas to improve community response and preparedness for wildland fire; 3) create an action plan that prioritizes actions to reduce hazardous fuels; 4) enhance emergency response; and 5) strengthen public education and prevention activities.

The plan covers all lands and ownerships within the boundaries of the plan area, which includes the Rim-Paunina project area. Adjacent to the Rim-Paunina project area, there are five communities-at-risk. A community-at-risk is an interface community (as defined in the Federal Register notice of January 4, 2001) or a group of homes and other structures with basic infrastructure and services (such as utilities and collectively maintained transportation routes) in or adjacent to federal land, which has conditions conducive to large-scale wildland fire or faces a significant threat to human life or property as a result of a wildland fire (USDA Forest Service, DOI Bureau of Land Management 2004). There is a small amount of Wildland Urban Interface overlap with the project area. Also, due to relatively recent fuels reduction activities in these WUI areas, there are few acres within the Rim-Paunina area proposed for treatment.

**Table 80. Communities-at-Risk in the Rim-Paunina Project Area**

| Schoonover and Vicinity Cluster | Two Rivers North/Little Deschutes River Cluster |
|---|---|
| Cascade Estates | Two Rivers North |
| Marsha Way | |
| Schoonover | |
| Tall Pines | |

[26] Minimum down wood requirements are Plant Association Group specific for dependent wildlife species.

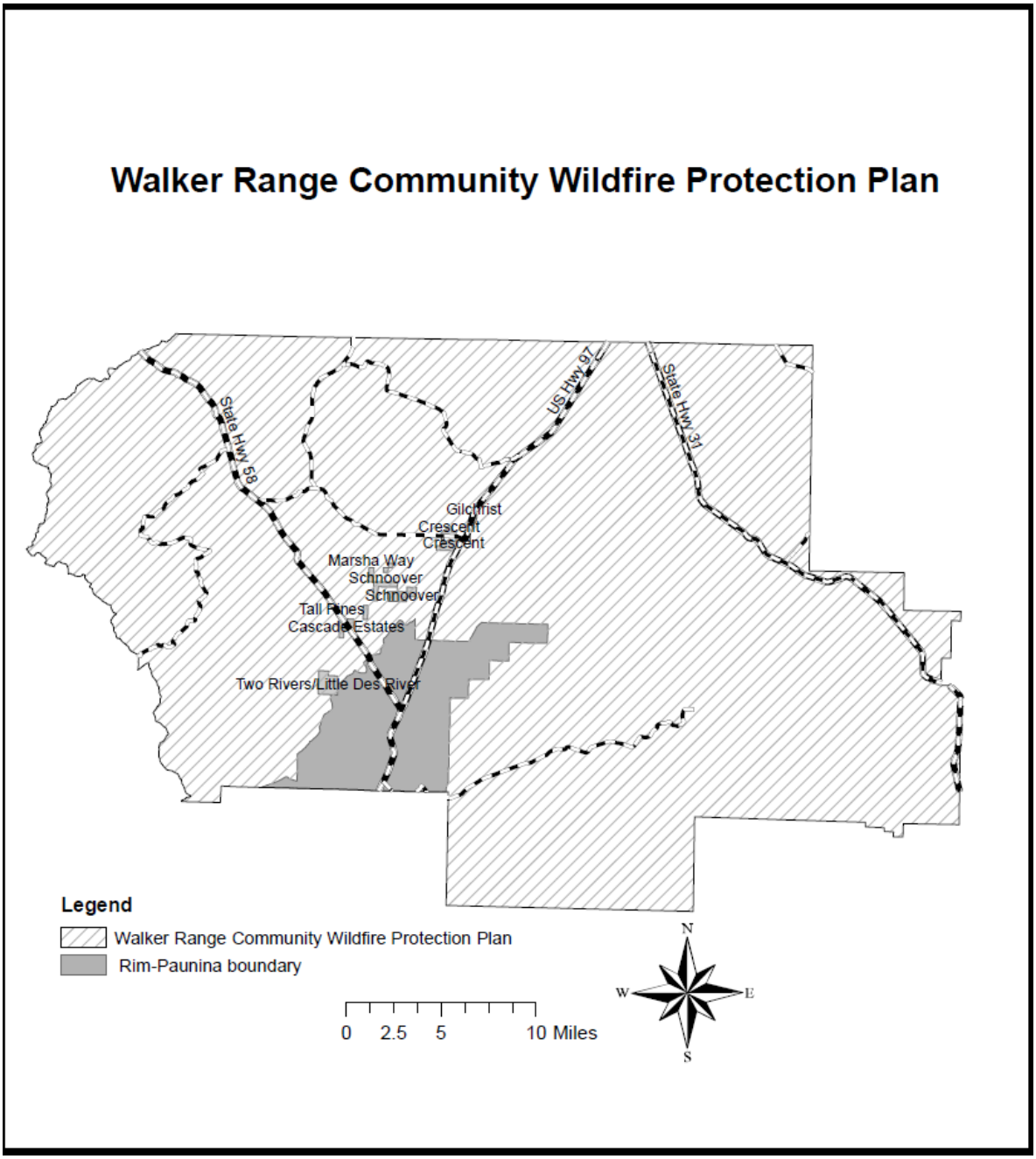



**Figure 39. Walker Range Community Wildfire Protection Plan Area**

The following are terms and definitions used in this analysis in the discussion of fuels and suppression:

**Fuels**

The term "fuels" refers to the vegetative material, both living and dead, that is capable of carrying a fire across a landscape. Fuels can include conifer needles, fallen limbs, and slash remaining after timber harvest, living trees with crowns that are close to the ground, and standing dead or fallen trees.

**Canopy Base Height:** The height above the ground of the first canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of a fire. Low canopy base heights have been shown to initiate crown fire behavior (Alexander 1988).

**Canopy Bulk Density:** The mass of canopy fuel per unit of canopy volume. The critical canopy bulk density required to sustain a crown fire is measured at 0.0069 pounds per cubic foot ($lb/ft^3$) per acre **(**Sando and Wick 1972; Harrod et al. 1998). Contemporary stands, such as those in the Rim-Paunina area, can be as high as 1,400 percent of the critical threshold value.

**Extended Attack:** When a fire has not been contained by the initial attack resources dispatched to the fire, will not have been contained within the management objectives that are established for that zone or area, and has not been contained within the first operational period. *Wildland and Prescribed Fire Management Policy-Implementation Procedures Reference Guide (Run Cards).*

**Initial Attack:** Initial attack is the fire suppression effort that takes place as soon as possible following a wildland fire report. Initial attack is conducted by preplanned suppression resources; the type and number of available resources change depending on the fire danger of the day. More information on initial attack resources can be found in the *Wildland and Prescribed Fire Management Policy-Implementation Procedures Reference Guide (Run Cards).*

**Ladder Fuels:** Fuels that provide vertical continuity between the ground and tree crowns, thus creating a pathway for a surface fire to move into the overstory tree crowns (R8-TP-11, 1989).

**Trees per Acre:** The number of trees of a specific diameter on an acre of land. Small diameter trees contribute to fire behavior.

**Fuel Models:** Fuel models are a tool used to standardize discussion of fuel conditions on a landscape. Fuel conditions, defined by quantity and arrangement, have been categorized into 40 standard descriptive fuel models (Scott and Burgan 2005).

**Fire Regime**

Because of the controversy and simplicity of using Fire Regime Condition Class (FRCC) (Morrison and Smith 2005), FRCC was not used as the primary basis for decision making. However, fire regimes were used as a reference condition to determine ecological capability and departure.

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993; Brown 1995). Coarse scale definitions for natural (historical) fire regimes have been developed by Hardy et al. (2001) and Schmidt et al. (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation.

These five regimes include:
**I** – 0-35 year frequency and low (surface fires most common) to mixed severity;
**II** – 0-35 year frequency and high (stand replacement) severity;
**III** – 35-100+ year frequency and mixed severity;
**IV** – 35-100+ year frequency and high (stand replacement) severity; and
**V** – 200+ year frequency and high (stand replacement) severity.

***Fire Regime Condition Class (FRCC)***

Fire Regime Condition Class (FRCC) is a measure for ecological trends and not a hazard metric. It is useful for comparing existing to reference conditions and the role of fire to the disturbance process. FRCC is performed for large scales at a watershed or larger. To draw conclusions on a stand basis would not be an accurate use of FRCC. A Fire Regime Condition Class (FRCC) is a landscape classification that describes the amount of departure from the natural (historical) fire regime. It includes three condition classes for each fire regime. This departure results in changes to one (or more) of the following ecological components:

- Vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern);
- Fuel composition;
- Fire frequency, severity, and pattern; and
- Other associated disturbances (e.g. insect and disease mortality, grazing, and drought).

The three condition classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural regime. These are determined on a large landscape scale and are not appropriate at the stand level.

***Low*** departure is considered to be within the natural range of variability, while ***moderate*** and ***high*** departures are outside. Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural fire regime. Determination of amount of departure is based on comparison of a composite measure of fire regime attributes, as listed above. Table 81 displays the Fire Regime Condition Classes, their descriptions, and the risk potential associated with each condition.

**Table 81. Fire Regime Condition Classes**

| Fire Regime Condition Class | Description | Potential Risk |
|---|---|---|
| **Condition Class 1** | Within the natural (historical range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances. | • Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics.<br>• Composition and structure of vegetation and fuels are similar to the natural (historical) regime.<br>• Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.<br>• Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). |

| Fire Regime Condition Class | Description | Potential Risk |
|---|---|---|
| **Condition Class 2** | Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances. | • Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe).<br>• Composition and structure of vegetation and fuel are moderately altered.<br>• Uncharacteristic conditions range from low to moderate.<br>• Risk of loss of key ecosystem components is moderate.<br>• Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). |
| **Condition Class 3** | High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances. | • Composition and structure of vegetation and fuel are highly altered.<br>• Uncharacteristic conditions range from moderate to high.<br>• Risk of loss of key ecosystem components is high. |

The following fuel models were identified within the Rim-Paunina area.

**Table 82. Fuel Models within the Rim-Paunina Project**

| Fuel Model | Description |
|---|---|
| TL3 (183) Mixed Conifer, Lodgepole Pine and Mountain Hemlock | The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low (0-2 ch/hr; flame length low (1-4'). |
| TL4 (184) Lodgepole Pine | The primary carrier of the fire is a moderate load of fine litter and small diameter downed logs. Spread rate is low (2-5 ch/hr); flame length low (1-4'). |
| TL5 (185) Mixed Conifer | The primary carrier of fire in TL5 is high load conifer litter; light slash or mortality fuel. Spread rate is low (2-5 ch/hr); flame length low (1-4'). |
| TL6(186) Ponderosa Pine | The primary carrier of the fire is moderate load long needle litter. Spread rate is moderate (5-20 ch/hr); Flame length is low (1-4'). |
| TL9 (189) Ponderosa Pine | The primary carrier of fire in TL9 is very high load, fluffy broadleaf litter. TL9 can also be used to represent heavy needle-drape. Spread rate is moderate (5-20 ch/hr); flame length moderate (4 – 8'). |

### Fuels Conditions Current and Historic by Plant Association Group within the Project Area

***Ponderosa Pine***
***15,522 acres (39 percent of the planning area)***
***Fire Regime I Condition Class II***
Important changes have occurred in these forests since 1900 due to several factors, but mainly due to fire exclusion policies. Nonlethal fire has decreased while lethal fire has increased. The general result has been a shift of the composition of tree species from fire tolerant to fire intolerant and the biophysical

environment of stands has changed from large trees and single strata to large trees and multiple strata. Overly dense stands competing for limited water and nutrients has resulted in slow growth and poor vigor. Growth stagnation has rendered the dominant trees highly vulnerable to mortality in epidemics of bark beetles, defoliating insects, diseases such as dwarf mistletoe, and various root rots (Biondi 1996; Byler and Zimmer-Grove 1991; Cochran and Barrett 1998). These successional changes have resulted in a buildup of understory or ladder fuels that facilitate less lethal ground fires to more easily transition into more lethal and sustained stand-replacing crown fires. Coupled with the normally dry climate and frequent lightning- and human-caused ignitions, this has resulted in a dramatic increase of severe wildfires in the ponderosa pine type in recent decades (Arno 1996; Williams 1995).

Prior to 1900 ponderosa pine communities experienced frequent fires as a result of highly combustible leaf litter, an abundance of cured herbaceous vegetation, and a long season of favorable burning weather. Stands had an open, park-like appearance, dominated by large old, fire-resistant trees. Shrubs, understory trees, and downed logs were sparse, as testified to by dozens of historical photographs and narrative accounts (Cooper 1960; Leiberg 1899; Wickman 1992).

The most comprehensive fire history for the Pacific Northwest ponderosa pine series is based on data from the vicinity of Bend, Oregon (Bork 1985). Fire historically reduced dwarf mistletoe infection by pruning dead branches and consuming individual tree crowns that had low-hanging witches' brooms (Harrington and Hawksworth 1990; Koonce and Roth 1980). Non-sprouting shrubs, such as bitterbrush, that used to be much more limited in cover because of frequent underburning are now widespread. Although bitterbrush can sprout after light spring burning (Martin and Driver 1983), fire often kills it. Frequent light burning allowed bunchgrasses and most forbs to recover rapidly (Wright et al. 1979), so herbaceous vegetation dominated the understory. The natural landscape pattern of ponderosa pine forests was seemingly unbroken parkland of widely spaced tree clumps and continuous herbaceous understory (Agee 1994; Gruell et al. 1982). In most stands, duff depth probably averaged only about half an inch (Keane et al. 1990).

It is commonly recognized that wildfires are a natural and desirable characteristic of forested landscapes, especially on the east slope of the Cascade Range (Agee 1994). Although this condition has changed as evidenced in several recent fires on the Deschutes National Forest, fires in ponderosa pine and dry, mixed-conifer forests historically burned fine fuels (e.g. grasses and litter on the forest floor) at regular intervals. These surface fires rarely killed large, fire resistant trees, but did kill smaller trees of all species, thereby helping to maintain sparse, open stands (Noss et al. 2006 pg 482 citing Veblen et al. 2000; Eyerdahl et al. 2001; Stephens and Collins 2004).

***Lodgepole Pine***
**17,204 acres (43 percent of the planning area)**
**Fire Regime III Condition Class II**
Sierra lodgepole pine, which is very similar to the lodgepole pine in central Oregon, is fire sensitive (Atzet et al. 1990; Rundel et al. 1977). After stand-replacing fire, it typically establishes from wind-dispersed seed. Agee (1981) reported that establishment of lodgepole pine in Crater Lake National Park Oregon, was favored by fires of moderate to high severity. Fire-return intervals in lodgepole pine forests vary. On the eastern slope where drier conditions prevail, such fires may occur at intervals of less than 20 years (Atzet et al. 1990). Stand-replacing fires are related to insect attacks, particularly by mountain pine beetle, and declining vigor and high fuel loading in older stands (Atzet et al. 1990; Dickman and Cook 1989; Heinrichs 1983). Currently, the Crescent Ranger District is bordered by a wide scale mountain pine beetle infestation event in lodgepole pine to the north and south along the Cascade Mountain Crest. Mortality is most evident from Diamond/Crater Lake north through the Three Creeks area (Sisters) up to Mount Jefferson and west to the Willamette National Forest.

In this moderate severity fire regime, a typical disturbance scenario includes selective removal of about a third of the stands every 60 years, either by insects, fire, or a combination of the two (Agee 1994). Stuart (1984) documented a 60-year fire return interval on the Fremont National Forest. Agee (1981) also found a 60-year interval at Crater Lake National Park, and Chappell (1991) found a 40-year fire return interval in a California red fir (*Abies magnifica* A. Murr.) forest directly adjacent to a lodgepole pine flat. The magnitude of natural fires ranges from crown fires to "cigarette burns," where fires slowly burn along jackstrawed log corridors composed of beetle-killed trees (Agee 1994).

***Mixed conifer***
**7,135 acres (18 percent of the project area)**
**Fire Regime IV Condition Class II**
This is a diverse group of forests that have a stand-replacement fire regime and are dispersed throughout much of the Interior West, usually at middle elevations in the mountains. In the Rim-Paunina area, most are on the slope of the rim with a western aspect. Principal tree species are white fir and grand fir (potential climax), interior Douglas-fir (seral or climax), and larch, lodgepole pine, and aspen (early seral associates). In the project area, white, ponderosa and sugar pine are also a component. These forests commonly develop dense stands with accumulations of ladder fuels and they often occupy steep slopes on cool aspects. The forest floor fuels are primarily a compact duff layer that does not support low-intensity surface fires. However, stands within the Rim-Paunina area more closely resemble the ponderosa pine biophysical environment. When down woody or ladder fuels accumulate and severe burning conditions arise, they can support a stand replacing surface or crown fire. Such fires occurred at intervals averaging between 70 and 200 years. Similar compositional types in other geographic areas or on different topographic situations are associated with mixed fire regimes.

The relative amounts of these types in mixed and stand-replacement fire regimes are unknown (Brown et al. 1994). Also, the factors that determine whether one of these forests would have a mixed or stand-replacement regime is not known, but lack of receptiveness of surface fuels to burning, characteristically dense stands, steep slopes, and frequent strong winds probably favor the stand-replacement fire regime.

Photo comparison and fire history studies suggest that fire exclusion has allowed a greater proportion of these inland forests on the landscape to develop as dense stands. The spatial continuity of these stands may allow insect and disease epidemics and stand-replacement fires to become larger than in the past (Arno and Brown 1991; Byler and Zimmer-Grove 1991; Gruell 1983). At the same time seral grassland species, shrubs, aspen, and seral conifers are being replaced by thickets of shade tolerant conifers, as evidenced in Rim-Paunina unit 621 with the loss of aspen and other unique herbaceous species.

Table 83 displays the current condition of fuels in the plant association groups (PAGs) most frequently found in the Rim-Paunina analysis area. For a detailed description of the species and plant association groups present, refer to the "Forested Vegetation" section of Chapter 3.

All past activities have been included in this description and subsequent modeling.

**Historic Fire Weather and Fire Occurrence**
This section of the fuels analysis was conducted using FireFamily Plus computer model. FireFamily Plus is a software system for summarizing and analyzing historical daily fire weather observations and computing fire danger indices based on the National Fire Danger Rating System (NFDRS). Historic weather observations and wildland fire data were obtained for 1991 to 2004 for the Deschutes National Forest. All data inputs were collected from the project area and can be found within the project file.

The current condition of eastside forests is markedly different from the historic condition of the landscape, and recent wildfires are showing an increasing tendency to become "problem fires."

**Table 83. Summary of Existing Forest Structure in the Rim-Paunina Project Area**

| | Ponderosa Pine | Lodgepole Pine | Mixed Conifer |
|---|---|---|---|
| **Total Acres** | 15,522 | 17,204 | 7,135 |
| **Fuel Model** | TL8 | TL4 | TL5 |
| **Canopy Bulk Density**[27] | ~.0104 lb/ft$^3$/ac | ~.0161 lb/ft$^3$/ac | ~.0161 lb/ft$^3$/ac |
| **Fire Regime Condition Class** | I/2 | III/2 | IV/2 |
| **Fire Behavior** | Active Crown | Active Crown | Active Crown |
| **Canopy Base Height** | 1' (60%)<br>6' (40%) | 1' (80%)<br>3' (20%) | 1' (60%)<br>6' (40%) |
| **Trees Per Acre <6" Diameter (average)** | 600 | 2100 | 1400 |

## Fire Danger Rating

Historical Fire Danger is based on weather conditions and probability analysis using the National Fire Danger Rating System (NFDRS) fuel model G, (Short Needle Pine, Heavy Dead) with standard model fuel loadings. The primary carriers of a fire in this fuel type are the heavy ground fuels. The fire season for the National Forests in Oregon has historically been from May 1 to October 31. The Energy Release Component of fires for the fire seasons from 1991 to 2004 were analyzed, and the average number of days in each Fire Danger Rating category was calculated (Table 84).

**Table 84. Average Days of Oregon Fire Season by Fire Danger Rating (1991-2004)**

| Fire Danger Rating[28] | Number of Days in Season | Percent |
|---|---|---|
| Low | 23 | 16% |
| Moderate | 69 | 48% |
| High | 41 | 29% |
| Extreme | 10 | 7% |

## Fire Size

Table 85 displays the historical fire occurrence by class, number, and acres consumed from 1980 through 2007. "A" fires are zero to 0.25 acres, "B" fires are 0.26 to 9.9 acres, "C" fires are 10 to 99.9 acres, "D" fires are 100 to 299.9 acres, "E" fires are 300 to 999.0, "F" fires are 1,000 to 3,000 acres, and "G" fires are over 3,000 acres. A vast majority of fires in the project area (see Table 85) are between 0.25 and 9.9 acres in size as determined by using ArcMap data for the period from 1980 through 2007. The only recent large fire within the Rim-Paunina project area was approximately 100 acres along Highway 97 and caused by the railroad in 1978.

**Table 85. Historical Fire Occurrence in the Rim-Paunina Area by Class, Number, and Acres Consumed from 1980 through 2007**

| Class | Number of Fires | Acres Consumed |
|---|---|---|
| **A** | 91 | 9 |
| **B** | 18 | 14 |

[27] The critical canopy bulk density required to sustain a crown fire is measured at 0.0069 pounds per cubic foot (lb/ft$^3$) per acre.

[28] Based on the Energy Release Component (ERC) which is an NFDRS output estimating potential available energy released per unit area in the flaming front of a fire.

**Fire Cause**

Lightning is the leading cause of fire and was associated with nearly 60 percent of fire starts from 1980 to 2007 (Figure 40).

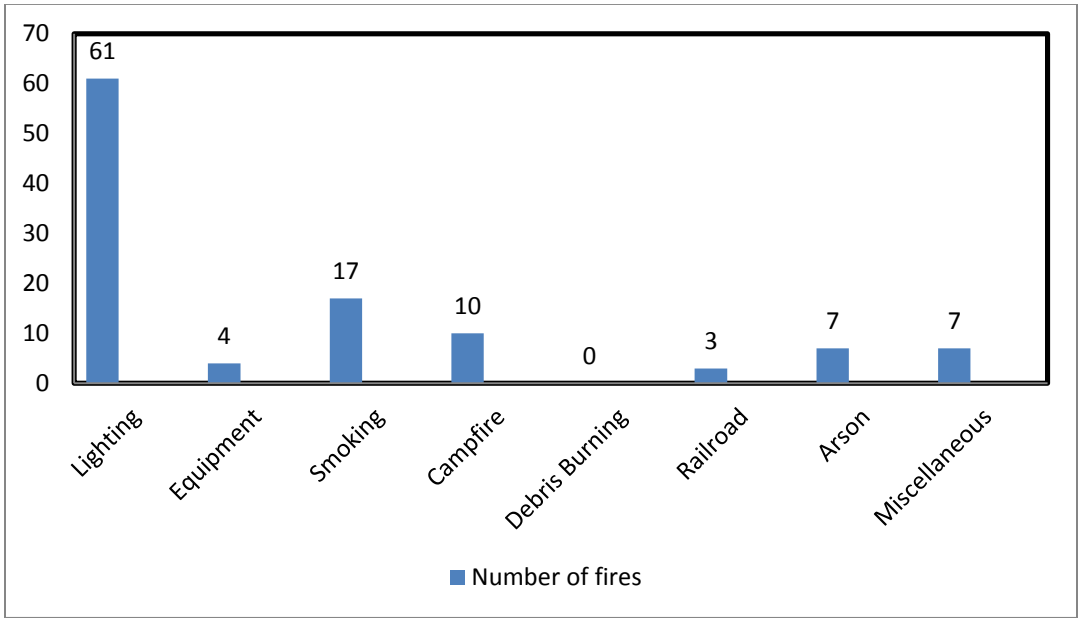



**Figure 40. Leading Causes of Fire between 1980 to 2007**

***Problem Fires***

Problem fires are wildfires that, because of extreme fire behavior, present a high risk to human safety and loss of forest resources. Generally, fire behavior includes:

- Rates of spread greater than 12 chains/hour (800 ft/hour)
- Active crown fire; and
- Flame lengths greater than eight feet.

Problem fires limit suppression strategy and tactic options because:

- Rates of spread are so high that the fire cannot be contained by initial attack suppression personnel.
- Crown fires cannot be attacked directly; suppression personnel must use indirect tactics with burnout operations or wait until the crown fire drops back to the ground and meets appropriate flame length and rate of spread criteria before direct attack can be initiated.
- Flame lengths greater than four feet are too intense for direct attack and handlines cannot be relied on to hold fire.
- Flame lengths greater than eight feet may present serious control problems so that control efforts at the head of the fire will probably be ineffective.

Other management issues associated with problem fire are:

- Problem fires pose a high risk to public and firefighter safety.
- Problem fires have the potential to create extensive resource damage.
- Problem fires require multiple days and/or months to contain and control and are very expensive to manage.

The 2003 Davis Fire is a recent example of a local problem fire. Situated on the Crescent Ranger District, it was fueled by vegetative conditions that are similar to those present over much of the Rim-Paunina project area. The Davis Fire was human-caused; the ignition location was in the West Davis Lake dispersed camping area, and it started relatively early in the fire season (June 28). It nearly burned into the community of La Pine, Oregon, and was essentially stopped by Wickiup Reservoir and actions by firefighters at the edge of Wickiup Acres, a small community. Suppression costs on the Davis Fire were in excess of eight million dollars. It is estimated that at its most extreme, the Davis Fire had flame lengths of up to 50' and burned several miles in length in less than an hour. Suppression activities went on for 12 weeks before firefighters could contain it, and continued for another two weeks before control could be declared. The fire burned about 21,000 acres with complete mortality of vegetation over approximately 80 percent of the fire area. While hemlock burned within historic conditions during the Davis Fire, ponderosa pine and Douglas-fir (typically fire-resistant species) and lodgepole pine stands in the fire area experienced much higher mortality than is typical under historic conditions.

**Fire Severity** The following figure (Figure 41) shows a change in fire severity between historic (pre-1900) and current conditions (post 1900) for Forest Service and Bureau of Land Management administered forested potential vegetation groups in the interior Columbia Basin and portions of the Klamath and Great Basins (Quigley et al.1996).

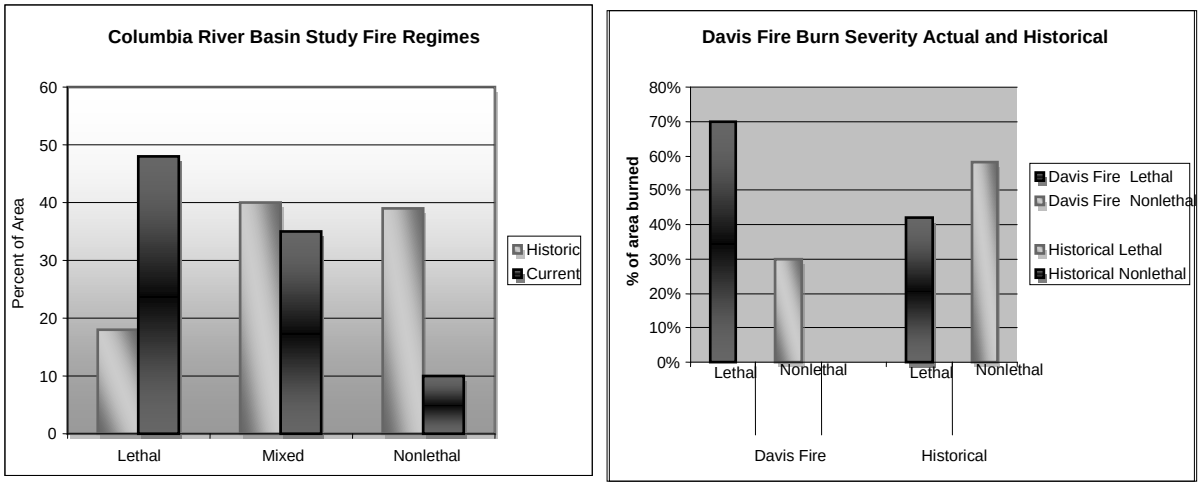



**Figure 41. A Comparison of Historic and Current Fire Severity**

## Predicted Fire Behavior

To show fire behavior comparisons between the fuel models and fuel loads, weather inputs and topographic inputs must be consistent. Black Rock is a Remote Automatic Weather Station (RAWS) and its observations were used because it is the closest and the most reflective of weather conditions within the project area. FireFamily Plus was used to analyze weather observations from the Black Rock weather station from 1991 to 2004. Weather observations at the 98$^{th}$ percentile ranking[29] were obtained for this analysis to calculate extreme fire behavior. Table 86 displays weather data used to calculate outputs for comparative fire behavior runs:

[29] The 98$^{th}$ percentile weather observation is the weather conditions which yields extreme (98th) fire danger ratings.

**Table 86. Modeled Inputs for Fire Behavior in the Rim-Paunina Project Area**

| Fire Weather | 1hr. fuel moisture (%) | 10hr. fuel moisture (%) | 100hr. fuel moisture (%) | 1000hr. fuel moisture (%) | Herbaceous fuel moisture (%) | Woody fuel moisture (%) | Midflame wind speed (mph) |
|---|---|---|---|---|---|---|---|
| 16-89th Percentile ("Average" fire season weather) | 5 | 6 | 12 | 13 | 45 | 89 | 2 |
| 90-97th Percentile ("High" fire season weather) | 3 | 4 | 8 | 9 | 33 | 70 | 2 |
| 98th Percentile (Problem Fire Weather)[30] | 2 | 3 | 7 | 9 | 33 | 70 | 17 |

Flammap[31] describes three different kinds of wildfire behavior:

1.-Surface fire that is carried primarily by surface fuels and remains on the ground
2.-Passive crown fire that can torch individual or small groups of trees, but is driven by a surface fire
3.-Active crown fire that produces a solid flaming front in the crowns of trees but can be independent of a surface fire.

**Table 87. Existing Stand Characteristic by Plant Association Group (PAGs) Proposed for Treatment**

| | Ponderosa pine group | Mixed conifer group | Lodgepole pine group |
|---|---|---|---|
| **Tons per Acre** | 32 | 31 | 28 |
| **Trees per acre < 6" Diameter** | 600 | 1400 | 2100 |
| **Bulk Density** | ~.0104 lb/ft$^3$ | ~.0161 lb/ft$^3$ | ~.0161 lb/ft$^3$ |
| **Canopy Base Height** | 1' (60%) 6' (40%) | 1' (80%) 3' (20%) | 1' (60%) 6' (40%) |
| **Fuel Model** | TL9 | TL5 | TL4 |

## Predicting Fire Behavior

Given information on fuel models and weather conditions, fire behavior can be predicted. It is assumed if the canopy base height is one foot or lower, surface fire flame lengths of one foot or greater would initiate a crown fire. Table 88 displays predicted fire behavior in the fuel models found in the Rim-Paunina project area in three weather conditions.

[30] Also recorded weather witnessed during Davis Fire exhibiting extreme fire behavior
[31] Flammap is a model used to simulate fire runs with various fuel types and weather parameters

**Table 88. Predicted Fire Behavior Associated with Fuel Models in the Rim-Paunina Project Area**

| Fuel Model | 16-89th Percentile Weather | | | 90-97th Percentile Weather | | | 98th Percentile (Problem Fire)Weather | | |
|---|---|---|---|---|---|---|---|---|---|
| | Flame Length (ft) | Rate of Spread (chains/ hour)* | Fire Type | Flame Length (ft) | Rate of Spread (chains/ hour) | Fire Type | Flame Length (ft) | Rate of Spread (chains/ hour) | Fire Type |
| **TL3** | 0.7 | 0.7 | Surface | 0.8 | 0.8 | Surface | 2.1 | 6.4 | Active Crown (6'CBH[32] Surface) |
| **TL4** | 0.9 | 0.9 | Surface | 1.0 | 1.1 | Surface | 3.1 | 11.9 | Active Crown (6'CBH Surface) |
| **TL5** | 1.3 | 1.6 | Surface | 1.6 | 2.0 | Surface | 6.1 | 35.4 | Active Crown |
| **TL6** | 1.7 | 2.0 | Surface | 2.0 | 2.5 | Surface | 8.3 | 53.5 | Active Crown |
| **TL8** | 2.2 | 2.3 | Surface | 2.5 | 2.8 | Surface | 9.6 | 47.1 | Active Crown |
| **TL9** | 3.1 | 3.4 | Surface | 3.6 | 4.1 | Surface | 13.6 | 69.1 | Active Crown |

*One chain is 66 feet.

**Resource Values at Risk in the Rim-Paunina Project Area**

The Rim-Paunina project area is composed of an approximately 40,000-acre watershed, 106 acres of which is private land. It also abuts the Gilchrist State Forest to the northeast.

The Deschutes Land and Resource Management Plan categorizes the Deschutes National Forest by Management Area. There is a mix of management areas within the project area, they include Management Area (MA) 8 (General Forest), MA-9 (Scenic Views), and MA-15 (Old Growth). The Desired Future Condition (DFC) of these lands would feature fire regimes back to their historic levels.

Private land is composed of residences, old growth parcels managed by private ownership, and the newly-created Gilchrist State Forest which was formerly intensively-managed timber owned by both private and industrial landholders.

**Fuel Treatments within Ground-based Harvest units**

Harvest activities would be accomplished by either yarding with top attached to top log or "whole tree". Several stages of hazard reduction activities would be staged with the end result of prescribed underburning in appropriate stands. First, utilization of any available forest products such as post and pole material, firewood, or biomass would be encouraged in excess of down wood requirements. After utilization, piling by grapple or mastication/slashbusting would occur. Grapple piling would occur on existing skid trails and landings would occur mostly in activity units where small diameter thinning occurs. The amount of area unreachable by grapple depends on the skid trail spacing but it is estimated that 30 to 40 percent of each unit would not be reachable. Mowing/slashbusting would be allowed one pass off existing skid trails and landings. Typically low pressure and tracked machines would be utilized on existing slash and slashbusting would be utilized in visual corridors along the highways. The final step would be careful application of prescribed underburning in appropriate stands which also favors retention of fire resistant species. In some units, unmerchantable trees up to eight inches would be felled.

[32] CBH= Crown Base Height

Harvest activity is usually followed by post sale thinning of the smaller material which also reduces ladder fuels and lowers the overall density of the canopy.

Pruning of the remaining trees is proposed to reduce ladder fuels and increase crown base height of all trees. Pruning would be to a height of eight feet or one third of the crown height. It is anticipated that pruning would be applied to about 80 percent of each unit.

Prescribed fire would focus on reducing concentrations of dead and down material through piling with the piles disposed by either removal or burning. Prescribed fire would also be applied to fire dependent ecosystems through underburning to reduce dead and down material and reintroduce fire into fire dependent ecosystems. It is anticipated that prescribed fire would be applied to about 80 percent of each unit.

**Fuels Treatment Units where no Commercial Harvest occurs**

The purpose of these fuel reduction treatments would be to alter fuel profiles on the surface and to increase the crown base height or vertical continuity of fuels to reduce the possible initiation of a crown fire event. The goal would be to restore fire tolerant stands to a low-intensity, frequent fire regime. Basically, two methods would be utilized and coded as "Fuels Only". Integrated with the commercial fuel reduction activities, they have been strategically placed adjacent to private lands, the Gilchrist State Forest, and electronic facilities on Walker Rim.

The first non-commercial activity would occur mostly on the Walker Rim units where slopes are over 30 percent. Fuel reduction activities include hand felling of understory live trees up to eight inches in diameter. Also, removal of lower limbs (pruning) would occur on trees to a height of eight feet, or one third of the crown height on approximately 80 percent of each activity area. Handpiling and disposal of activity-generated slash would occur on the rim units and steeper slopes where machinery is not desired. Followed by prescribed underburning, the focus would be to reduce concentrations of dead and down material, or "jackpot" burning for stands that have missed several fire return intervals.

The second activity to facilitate return of a frequent, low-intensity fire regime would be in stands that need very little preparation except for brush mastication prior to reintroduction of fire. In order to maintain fuels at the desired level and to remain effective through time, prescribed burning as a maintenance tool would be evaluated every 8-15 years after an appropriate National Environmental Policy Act (NEPA) review.

In units that are deficient in down woody material, slash would be lopped and scattered.

**Direct and Indirect Effects**

BehavePlus is a personal computer (PC) based application used to generate fire behavior outputs such as rate of spread, flame length, fireline intensity, tree mortality, and scorch height. The strength of this model is the ability to compare potential wildland fire behavior outputs among the fuel models and by weather conditions for each alternative. The outputs reported in this section describe the potential behavior of a single point ignition wildland fire which is free to burn and develop into a headfire which is also described in Table 88.

This analysis uses a (PC-based) two-dimensional fire growth model that calculates fire growth and behavior by searching for the set of pathways with minimum spread times from a point, line, or polygon ignition source, keeping environmental conditions (fuel moistures and winds) constant for the duration of the simulation. The model was run four hours for each alternative without suppression action to display a "real time" scenario when multiple ignitions are common and detection and suppression action may be delayed. The four-hour model displays which fires could be successfully suppressed with initial actions

and which fires would likely require an extended attack. This is the timeframe in which an Incident Commander can make an informed decision on the probability of a fire being contained with suppression resources on scene (Boucher pers. comm. 2006). The model also displays whether a fire has exceeded initial action and where the likely burn path is located. Fires that exceed initial action usually require days to contain, are expensive to suppress, are much more dangerous, and have the highest potential for resource loss. The ignition points were chosen randomly downwind of the treatment units. Weather conditions and fuel moistures were used to replicate the 2003 Davis Fire, a local example of a "problem fire" where suppression efforts were ineffective. Using observations from the Davis Fire weather, a midflame wind speed of 17 mph and a wind azimuth of 240 degrees were used.

**Alternative A**

Modeling for alternative A (Table 89) predicted a spread rate up to 87 feet per minute and a flame length up to 14 feet. From a landscape perspective, this places the identified resource values at the greatest risk.

Using Flammap, modeling for all three weather conditions displayed a high intensity and severe fire behavior. It also showed favorable conditions for a sustained crown fire which typically causes mortality in most trees and shrubs in the wildfire's path. This correlates with results experienced in the Davis Fire where approximately 80 percent of the trees within the timbered stands were killed (Powers pers. comm. 2006). As seen in other high-severity wildfires, few surface fuels exist because they are consumed and the stand is set back to an earlier successional stage. Following the wildfire event, for the first 5 to 10 years, the fuel model would be either a shrub or timber litter model, dependent upon ceanothus establishing as the first pioneer species. Surface fuels would be comprised of large down wood, tree regeneration, and shrubs. Between 10 and 20 years when the fire-killed snags begin falling over, the fuel model would become a slash-blowdown fuel model. The canopy bulk density would not likely change over time. Dead and fallen trees would reduce the mass of canopy, but would be offset by the regeneration of young trees. This condition also maintains a static canopy base height.

**Table 89. Potential Fire Behavior Outputs for Alternative A**

| | **16%-89% Weather** | | | **90%-97% Weather** | | | **98%-Problem Fire Weather** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **TL4 LP** | **TL5 MC** | **TL8 PP** | **TL4 LP** | **TL5 MC** | **TL8 PP** | **TL4 LP** | **TL5 MC** | **TL8 PP** |
| **Flame Length** | 1' | 1' | 2' | 1' | 2' | 3' | 3' | 6' | 10' |
| **Rate of Spread (CH./HR.** | 1.0 | 1.6 | 2.5 | 1.1 | 2.0 | 3.0 | 11.4 | 35.4 | 46 |
| **Fire Type** | Surface | | | Surface | | | Active Crown | | Active Crown |

# RIM - PAUNINA ALTERNATIVE A MAJOR FIRE PATH

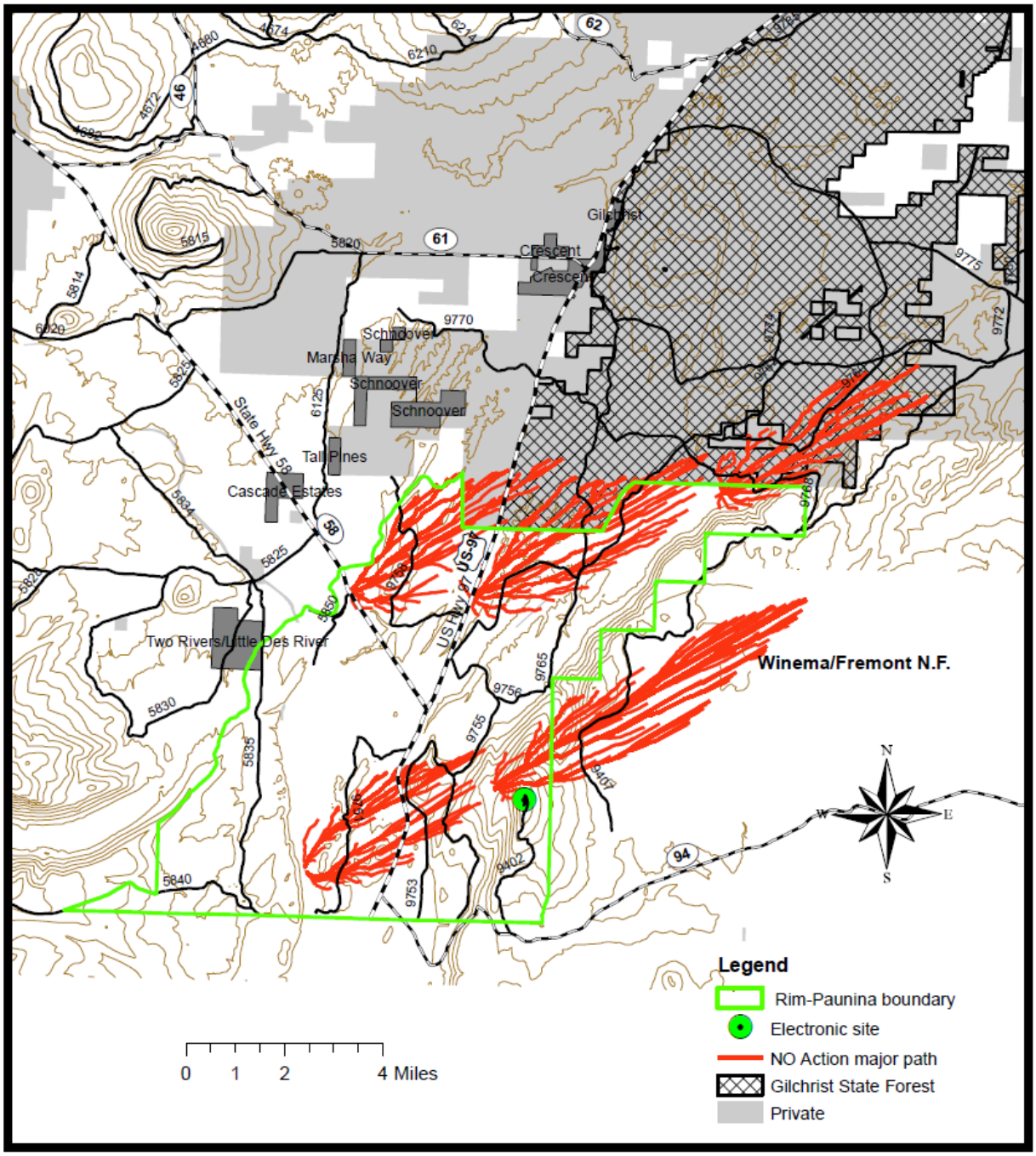



**Figure 42. Results of Alternative A Fire Pathway Analysis**

Under Alternative A, current management plans would continue to guide management of the project area. Response to environmental emergencies, such as suppression response to a wildfire would continue. The

condition class would continue to move from moderate to high departures from the central tendency of the historical regime. In Figure 42 notice the elongated pathway, particularly onto Walker Rim, the adjacent Gilchrist State Forest and private entities as compared to the Action Alternatives.

An important and safer suppression tactic of direct attack for flaming fronts of four feet high or less would not be an option under this scenario. This equates to a considerable decrease of firefighter and public safety as fire is more likely to become a crown fire and have long distance spotting, both of which provide little chance for a direct attack and limit suppression options. Also, over time, wildfire behavior is expected to become more severe as the landscape fuel profile continues to follow unaltered stand succession. Fire effects show an increase in tree mortality, soil exposure, and duff consumption. All three major stand types would shift toward a TU5 and TL9. TU fuel models is forest litter in combination with herbaceous or shrub fuels and TL fuel models is dead and downed woody fuels.

**Fire Effects Common to All Action Alternatives**

**Timing of Slash Cleanup**

In general, harvest and temporary road building operations break up the continuity of fuels strata resulting in a reduction of fire severity. However, there may be an elevated level of fine fuels (one year or less) in the short-term between harvest operations and post-harvest activities. The primary risk in these areas would be from a human-caused ignition. Typically, during the summer months, contract operations are suspended during the times of highest industrial fire precaution levels, or mitigated through additional equipment on site, shut down times, and fire patrol. Historical records have shown that risk of a fire ignition as a result of harvest operations is much lower than from the recreating public, and should a fire result, a successful suppression is much more likely due to equipment and personnel on site. This risk was accounted for in the modeling; specifically the human-caused ignitions.

Thinned stands of trees can have a shortened time lag for drying fuels and potential increases in surface winds relative to more closed stands. This effect becomes less of a factor for fire behavior as summertime weather progresses. Although closed stands take longer to reach low fuel moistures than open sites, as less moisture recovery occurs in July, August, and September, fuel moistures in closed stands reach equilibrium with open sites relatively quickly. When this occurs, crown-driven wildfires are much easily initiated. The closed sites have more available flammable fuel due to higher levels of biomass across the fuels strata and live tree fuel moisture at its lowest level.

**Alternative B**

Alternative B would implement activities on a total of 12,036 acres, facilitating a return of an appropriate frequent, low-intensity fire interval on 8,506 acres. It would directly reduce the severity of fire behavior within the activity units, plus 5 to 15 percent of the area downwind of activity units. Within the activity units, fire behavior modeling (Table 90) of post-treatment conditions shows an average spread rate of less than eight feet per minute and an average flame length of two feet or less, except under “Problem Fire” conditions where expected rates of spread are no greater than 52 feet per minute and an average flame length of no greater than nine feet. Under all but problem fire weather conditions, expected fire behavior allows a greater chance of a successful initial attack with fewer resources than in Alternative A. Within activity units, a successful initial attack is probable on nearly all 161 days of a fire season. This equates to a considerable increase of firefighter and public safety as fire is more likely to remain on the ground and can be directly attacked with direct handline.

Compared to Alternative A, Alternative B would also create conditions that provide more suppression options, including use of water to establish fireline, backfiring from control lines, or using natural barriers. As evidenced by the Davis Fire, areas where the fuel stratum was modified provided an opportunity for placement and control of fireline along the edge of a wildfire suppression effort.

The following Table 90 displays the potential fire behavior outputs for Alternative B, compared to Alternative A in parenthesis. In Figure 43, notice the shorter four hour fire pathway to Walker Rim, the adjacent Gilchrist State Forest, and private entities from the ignition points along Highways 97 and 58 as compared to Alternative A. However, the fire pathway from the ignition point at the electronic site onto the adjacent Fremont-Winema National Forest did not decrease. A corresponding lower risk of crown fire in Alternative B than in Alternative A increases the likelihood of large trees surviving a wildfire event.

**Table 90. Potential Fire Behavior Outputs for Alternative B Compared to Alternative A**

| | **16%-89% Weather** | | | **90%-97% Weather** | | | **98%-Problem Fire Weather** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **TL3 LP** | **TL3 MC** | **TL3 PP** | **TL3 LP** | **TL3 MC** | **TL3 PP** | **TL3 LP** | **TL3 MC** | **TL3 PP** |
| **Flame Length** | 1'(1') | 1'(1') | 1'(1') | 1'(2') | 1'(2') | 1'(3') | 2'(3) | 2'(6') | 2'(10') |
| **Rate of Spread (CH./HR.** | 0.8 (1.0) | 0.8 (1.8) | 0.8 (2.5) | 0.9 (1.2) | 0.9 (2.2) | 1.0 (3.0) | 6.0 (11.4) | 6.0 (34.4) | 6.0 (46.6) |
| **Fire Type** | Surface | | | Surface | | | Surface | | |
| **Acres of risk reduction activities** | 4547 | 988 | 6500 | 4547 | 988 | 6500 | 4547 | 988 | 6500 |

# RIM - PAUNINA ALTERNATIVE B MAJOR FIRE PATH

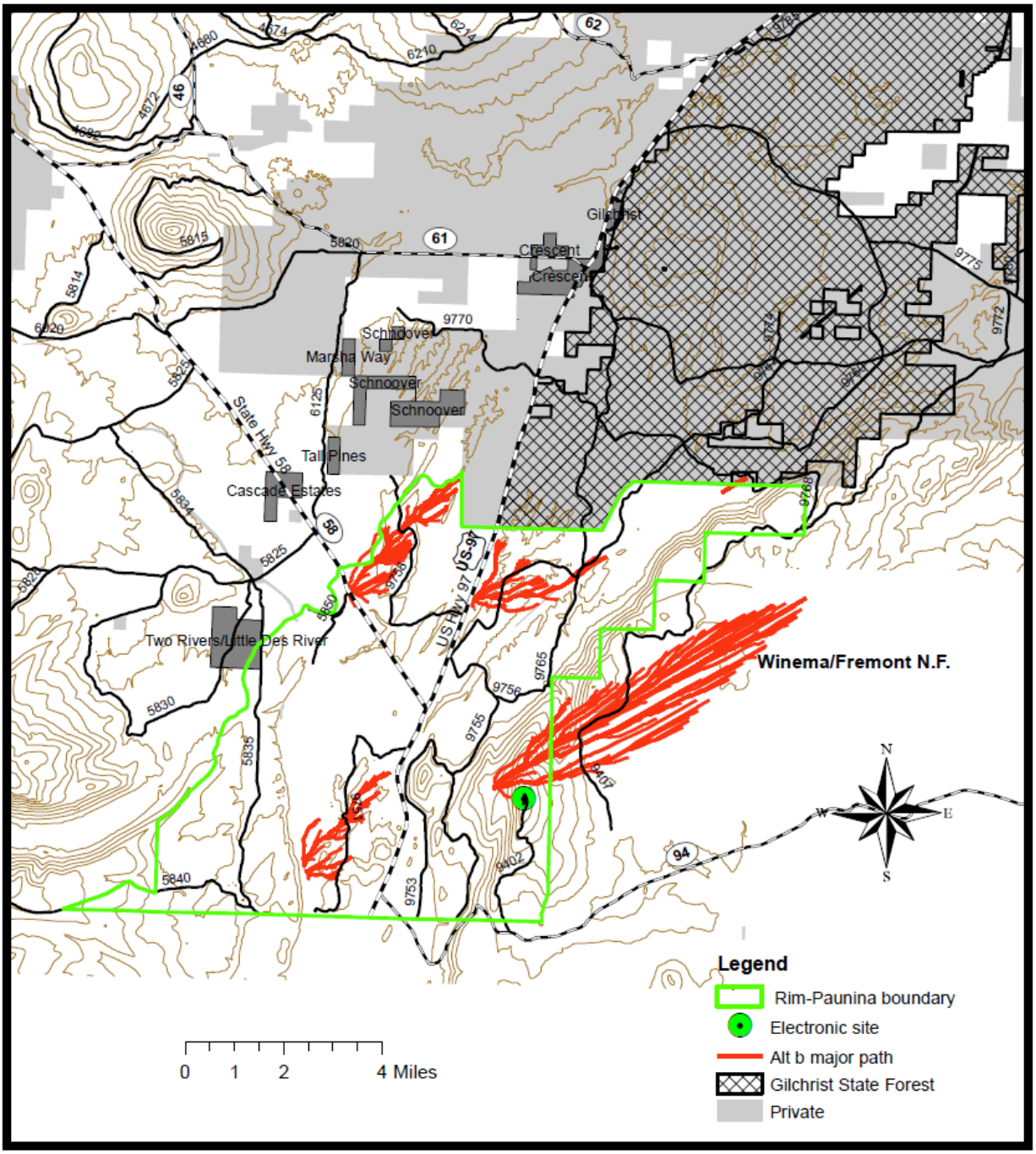



**Figure 43. Results of Alternative B Fire Pathway Analysis**

**Alternatives C and D**

Alternatives C and D would both implement activities on a total of 14,777 acres, facilitating a return of an appropriate frequent, low-intensity fire interval on 12,762 acres. The design of both of these alternatives responds to Key Issue #4 by expanding application of prescribed fire on 4,256 more acres than the proposed action. The difference between the two alternatives includes options for addressing severe dwarf mistletoe in stands; however, modeling and effects in this resource section display similarity because the modeling techniques are not sensitive to dwarf mistletoe infections. A comparison of how the action alternatives respond to Key Issue #4 and opportunities to restore ponderosa pine with a frequent low-intensity fire regime is displayed in Table 93.

Effects related to fire behavior expressed in Table 91 for Alternatives C and D are similar to those described for Alternative B, except for acres treated. Comparing fire pathways to Alternative B, Alternatives C and D provide a greater alteration of the fire pathway, affording greater risk reduction for the adjacent Gilchrist State Forest, the electronic site on Walker Rim, and onto the adjacent Fremont-Winema National Forests. This is mainly due to an emphasis on strategic placement of activities that facilitate return of a frequent fire regime in the ponderosa and mixed conifer plant association groups. It also is attributed to the non-mechanical small diameter thinning on Walker Rim.

**Table 91. Potential Fire Behavior Outputs for Alternatives C and D Compared to Alternative A**

| | 16%-89% Weather | | | 90%-97% Weather | | | 98%-Problem Fire Weather | | |
|---|---|---|---|---|---|---|---|---|---|
| | **TL3 LP** | **TL3 MC** | **TL3 PP** | **TL3 LP** | **TL3 MC** | **TL3 PP** | **TL3 LP** | **TL3 MC** | **TL3 PP** |
| **Flame Length** | 1’(1’) | 1’(1’) | 1’(1’) | 1’(2’) | 1’(2’) | 1’(3’) | 2’(3) | 2’(6’) | 2’(10’) |
| **Rate of Spread CH/HR*** | 0.8(1.0) | 0.8(1.8) | 0.8(2.5) | 0.9(1.2) | 0.9(2.2) | 1.0(3.0) | 6.0(11.4) | 6.0(34.4) | 6.0(46.6) |
| **Fire Type** | Surface | | | Surface | | | Surface | | |
| **Acres of Risk Reduction Activity** | 3669 | 2891 | 8217 | 3669 | 2891 | 8217 | 3669 | 2891 | 8217 |

***CH/HR is chains per hour, one chain equals 66 feet

# RIM - PAUNINA ALTERNATIVE C & D MAJOR FIRE PATH

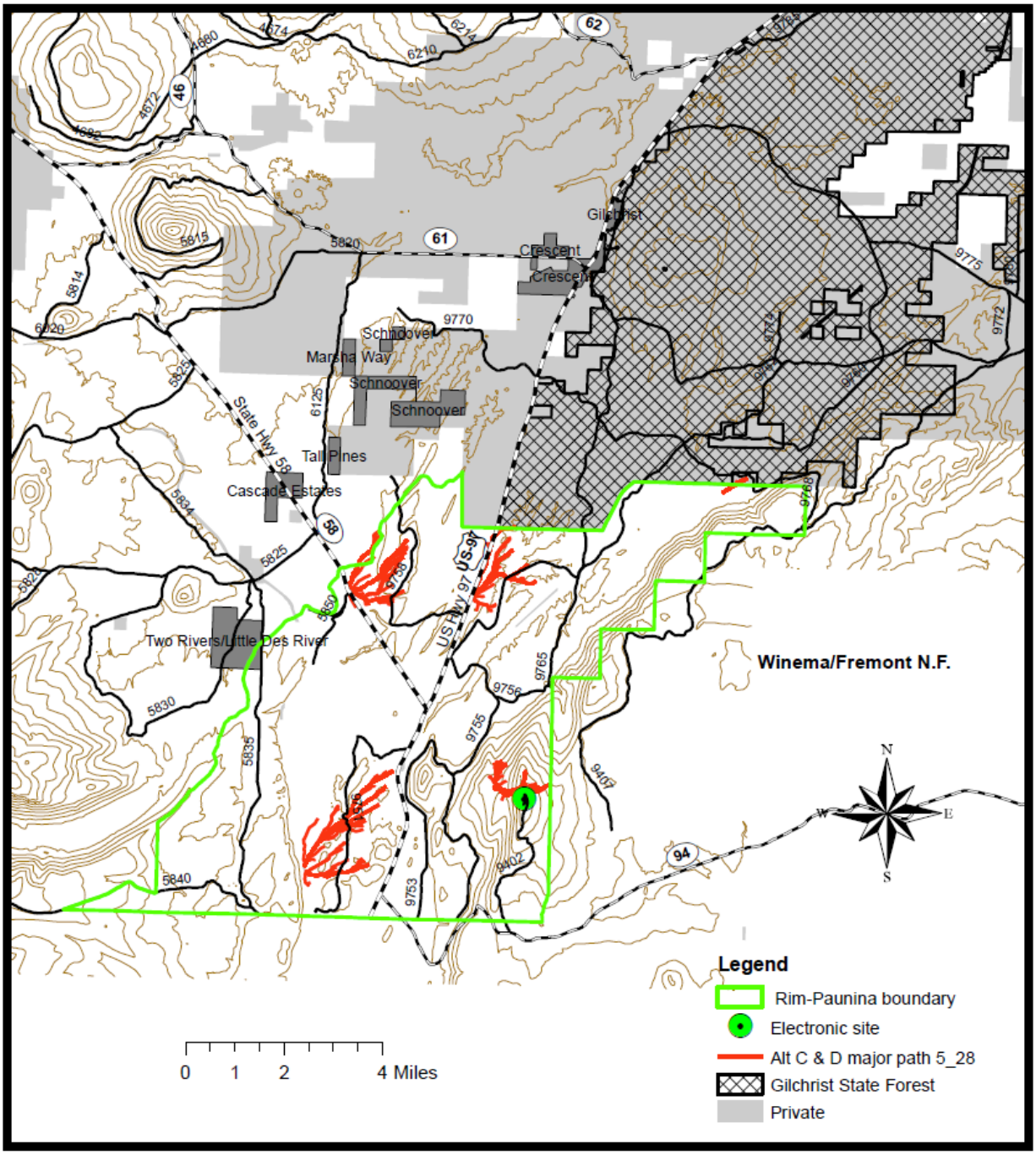



**Figure 44. Results of Alternatives C and D Fire Pathway Analysis**

**Alternative E**

Due to the scope and placement of activities designed to modify potential fire behavior, this alternative affords the greatest risk reduction on a landscape scale; particularly to the resources at risk along the north and east edges of the planning area. It implements activities on a total of 16,221 acres and facilitates a return of an appropriate frequent, low-intensity fire interval on 13,491 acres.

As described for Alternatives B through D, Alternative E fire behavior effects displayed in Table 92 show similar outputs for flame length, rate of spread, and fire type. The difference between Alternative E and the other action alternatives lies in the acres of risk reduction activity category and the effect on fire path at a landscape scale (Figure 45).

**Table 92. Potential Fire Behavior Outputs for Alternative E Compared to Alternative A**

| | 16%-89% Weather | | | 90%-97% Weather | | | 98%-Problem Fire Weather | | |
|---|---|---|---|---|---|---|---|---|---|
| | **TL3 LP** | **TL3 MC** | **TL3 PP** | **TL3 LP** | **TL3 MC** | **TL3 PP** | **TL3 LP** | **TL3 MC** | **TL3 PP** |
| **Flame Length** | 1’(1’) | 1’(1’) | 1’(1’) | 1’(2’) | 1’(2’) | 1’(3’) | 2’(3) | 2’(6’) | 2’(10’) |
| **Rate of Spread CH/HR** | 0.8(1.0) | 0.8(1.8) | 0.8(2.5) | 0.9(1.2) | 0.9(2.2) | 1.0(3.0) | 6.0(11.4) | 6.0(34.4) | 6.0(46.6) |
| **Fire Type** | Surface | | | Surface | | | Surface | | |
| **Acres of Risk Reduction Activity** | 4265 | 3019 | 8937 | 4265 | 3019 | 8937 | 4265 | 3019 | 8937 |

# RIM - PAUNINA ALTERNATIVE E MAJOR FIRE PATH

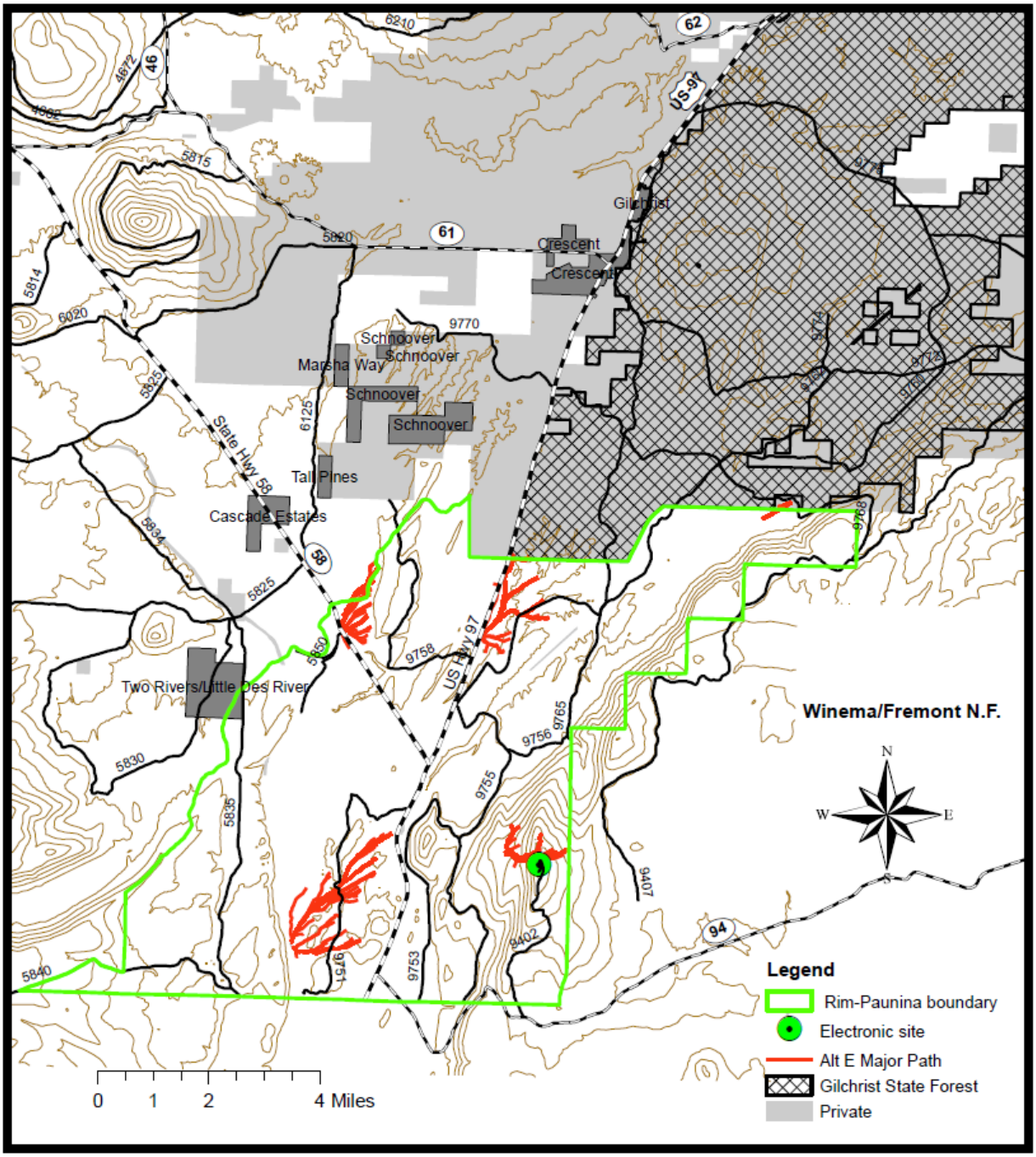



**Figure 45. Results of Alternative E Fire Pathway Analysis**

**Table 93. Comparison of how Action Alternatives Respond to Key Issue #4**

| | Alternative B | Alternative C | Alternative D | Alternative E |
|---|---|---|---|---|
| Acres Available for Return of an Appropriate Fire Interval Following Activity | 8,506 | 12,762 | 12,762 | 13,491 |

**Cumulative Effects**

The modeling and related discussions under the direct and indirect effects section included data imputed for BehavePlus and FlamMap from private land ownership and all past and present activities, using the District activity layers in the Forest Activity Tracking System (FACTS). The zone of influence is characterized as the Little Walker Watershed because it originates near the crest of the Cascade Mountains and terminates on Walker Rim, which simulates the most logical path for a wildfire that could potentially threaten the resources at risk within and adjacent to the Rim-Paunina area. All past, present, and reasonably foreseeable future actions (Table 19) were reviewed and it was determined that their affect to landscape scale processes was either included in the modeling or their effects were small enough to be dismissed. There are no foreseeable future actions that overlap in area. Remaining underburning units from an earlier decision (2005 Maintenance Burn Fuels Reduction Project: Railroad-Rimrose and East Slope Units) that have not been implemented were included in the proposed maintenance burning activities for Alternatives C through E.

The Forest Service voluntarily follows the guidelines assigned by Oregon Smoke Management to limit state-wide exposure on a cumulative basis, in compliance with the Clean Air Act. Therefore, thresholds are assigned for any incursions that may overlap into Rim-Paunina project area. For more discussion on this topic, reference the section under Air Quality and the Clean Air Act in Chapter 3.

The Three Trails OHV project represents a reasonably foreseeable action that has potential to supplement the effects discussed for this project. The Three Tails OHV EIS (December 2010) describes the effects on fire and fuels from the proposed action as:

> "Within a planned trail system, the number of potential ignition sources would increase from a potential 2.5 to 5.6 percent annual increase in visitors per year. Directing use to established and designated locations allows fire management personal to focus future hazard reduction activities in strategic areas…The closing of roads or converting roads to trails could increase response time, strategies, and tactics used. This could result in fire suppression being more expensive as aerial forces are employed. However, road closures to offset trail construction would concentrate forest users and could lower the risk of human-caused fires. Planned closures were well coordinated in an interdisciplinary manner. Therefore, administrative access is planned to match the appropriate risk in consideration of response times and suppression forces available by season. Overall, with the planned location of routes and designation of staging areas, risk is reduced because fire prevention efforts can be targeted to specific areas along with a comprehensive education program. Campfires in staging areas would be limited to approved fire pits, or not at all. Monitoring and education programs such as checking spark arrestors and updating visitors on summertime hazards can be accomplished in a few, targeted locations. (Three Trails OHV EIS, pg. 419)"

Overlapping actions between the Three Trails OHV project and hazards as discussed in the Rim-Paunina project do not change the effects disclosed under direct and indirect effects. Directing use to a designated trail system and the hazard from increased use in conjunction with road closures is offset by the benefits of public education and fire prevention strategies targeted in specific areas. Vegetation manipulation in

the Rim-Paunina project and the temporary hazard associated with timing of slash cleanup would result in a landscape scale reduction of risk, which does not change with a designated motorized trail system. Project Design Features have been developed (Chapter 2) to address timber sale activities and potential overlap of OHV trail segments in the Walker Rim area.

# Soil Quality

The Rim-Paunina project area is located in the southern portion of the Crescent Ranger District of the Deschutes National Forest. The planning area contains approximately 40,000 acres of National Forest System land. Management Direction for the planning area is provided by the Deschutes National Forest Land and Resource Management Plan (LRMP; U.S. Forest Service 1990) as amended by the Regional Forester's Amendment 2, Interim Riparian, Ecosystem, and Wildlife Standards (Eastside Screens). This report incorporates the soil specialist analysis in its entirety.

The proposed actions would authorize vegetation management and fuel reduction treatments to provide a variety of stand structures and habitats for a variety of species (flora and fauna) across and reduce the spread of dwarf mistletoe. There is also a need to contribute to the local and regional economies by providing timber and other wood fiber products. The same types of treatments would be used for each action alternative but the overall extent and locations of activity areas would be somewhat different. Management activities would include mechanical harvest and skidding of commercial size trees, non-commercial thinning using mechanical harvesters or by hand felling small-diameter trees with chainsaws, machine and/or hand piling and burning of slash materials, mowing brush, and the use of prescribed fire to reduce hazardous fuel accumulation and restore historic fire disturbance regimes across the landscape.

Commercial harvest would likely be accomplished using modern, track-mounted machines equipped with a felling head (harvester shear), and felled trees would be whole-tree yarded to designated skid trail networks and transported to landings using grapple skidders. Mechanical harvesters would only be allowed to make a limited number of equipment passes on any site-specific area. Skidders would be restricted to designated skid trails at all times. Main skid trails would be spaced approximately 100 feet apart on average. Most of the slash generated from harvest activities would be machine piled and burned on log landings and/or main skid trails.

There would be no new construction of roads that would remain as classified system roads. Temporary roads would be constructed to allow access to some activity areas, but these roads would be closed and rehabilitated upon completion of harvest activities. Some currently closed roads may be opened to provide necessary access, but these roads would be re-closed following harvest activities. Soil restoration treatments (subsoiling) may be used to rehabilitate temporary roads and some of the primary skid trails and log landings; however, before this restoration treatment is prescribed additional soil investigations would be made to determine whether this treatment would be appropriate on these soil types.

## *Affected Environment*

### Landscape Characteristics

Landforms within the Rim-Paunina planning include areas within the lower eastern flanks of the volcanic Cascade Range as well as a portion of the Walker Rim escarpment and ridge. In these areas all landforms, rocks, and soil materials are products of volcanism, glaciations, and major earth movements. Elevations range from approximately 6,800 feet on the top of Walker Rim to 4,400 feet on the landscape to the west. Mean annual precipitation increases with elevation and ranges from 20 inches to greater than 50 inches at higher elevations. Slopes within the Rim-Paunina planning area range from greater than 60 percent on the Walker Rim escarpment to a relatively flat landscape in the valley below. Dominant overlaying soils have developed from volcanic ash and pumice deposits that vary from 20 to 40 inches thick and consist of loose, sand to gravel size pumice particles with little or no structural development.

**Soil Quality**

The planning area contains 19 landtype units based on similarities in landforms, geology, and climatic conditions that influence defined patterns of soil and vegetation (Soil Resource Inventory, Larsen 1976). A map of these landtype units and their acreages within the planning are shown in Figure 46. The biophysical characteristics of these landtype units can be interpreted to identify hazards, suitabilities, and productivity potentials for natural resource planning and management.

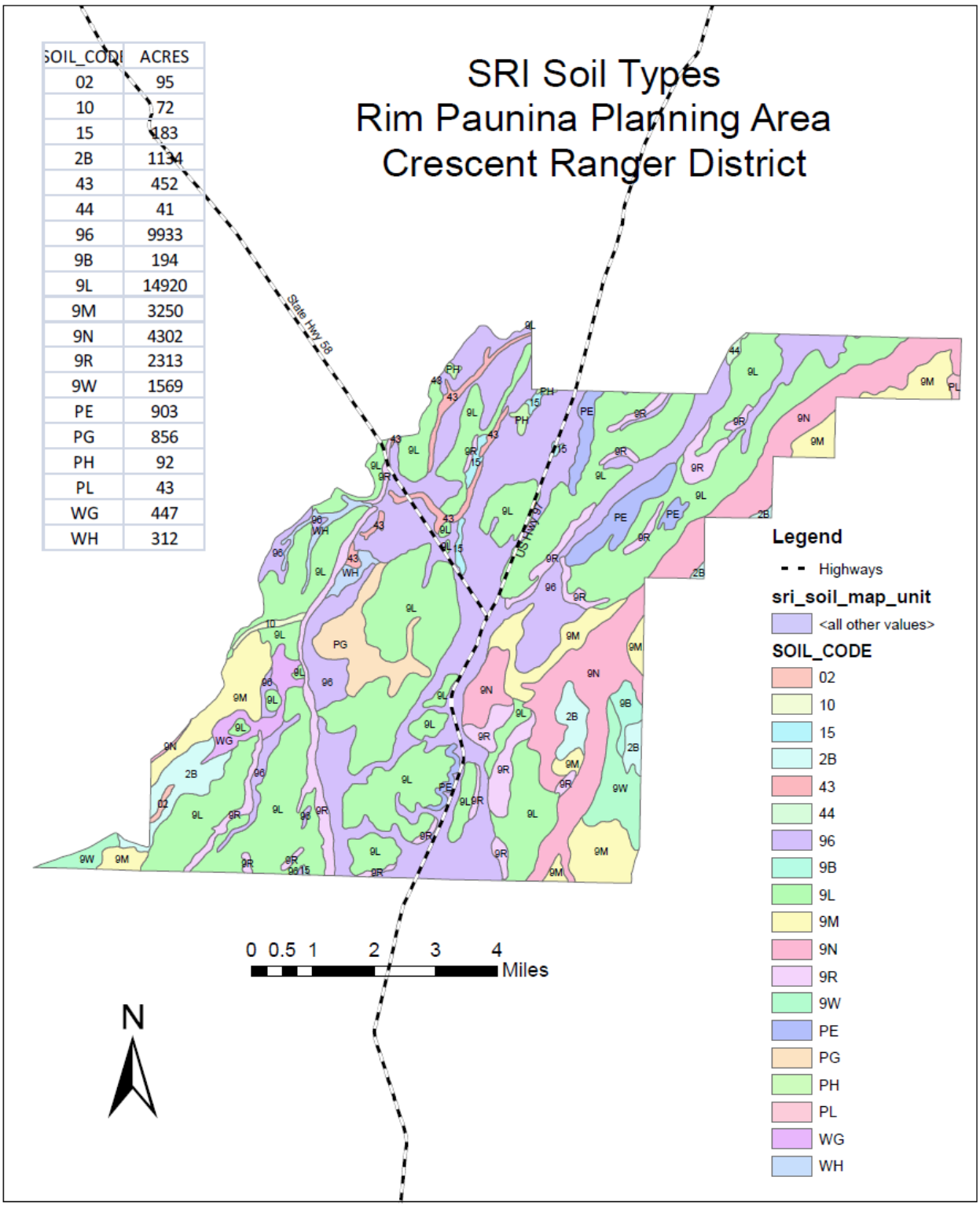
Soils on the Forest are derived from volcanic ash and pumice deposits and tend to be non-cohesive (loose) and have very little structural development due to the young geologic age of the volcanic parent materials. These soil types have naturally low soil bulk densities and vary in their ability to support equipment operations without being altered.

Soils within the Rim-Paunina planning area have developed in deposits of coarse Mazama pumice. Soil Resource Inventory mapping units within the Rim-Paunina planning area identify soils having between 20 and 40 percent coarse pumice fragments that are up to two inches in diameter (Larson 1976). Field investigations confirmed the existence of relatively large amounts of coarse pumice in the soil profiles of the planning area. These materials are coarser than most of the other Mazama pumice and ash deposits found on the Forest.

In an investigation of ponderosa pine and lodgepole pine seedling development in coarse pumice materials, Cochran (1971) identified a physical condition that was termed particle bridging. Particle bridging describes a condition in which coarse pumice particles are bridged together to form a semi-rigid structure in the soil profile. While particle bridging can impede seedling root development it can also increase the soils ability to support equipment operations without the soil being altered (Craigg 2000). Recent soil monitoring within the Rim-Paunina planning area has confirmed that, compared to many of the soils on the Forest, the soils within the Rim-Paunina planning area are less sensitive to alterations resulting in soil compaction. The increase in resistance of these soils to compaction is attributed to particle bridging of coarse pumice particles in the soil profile (Soil Monitoring Report 2010).

The sandy-textured surface layers are also 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. Due to their lack of plasticity and cohesion, the dominant sandy-textured soils within the project area are not susceptible to soil puddling damage.

The coarse textures of the ash/pumice-influenced soils in the planning area have high water infiltration and percolation rates that readily drain excess moisture over much of the planning area. The underlying residual soils and bedrock materials have a moderate capacity to store water. Most of the water yielded from these lands is delivered to streams as deep seepage and subsurface flows. There are, however, several intermittent and ephemeral streams channels within the planning area.




| SOIL_CODE | ACRES |
|---|---|
| 02 | 95 |
| 10 | 72 |
| 15 | 183 |
| 2B | 1134 |
| 43 | 452 |
| 44 | 41 |
| 96 | 9933 |
| 9B | 194 |
| 9L | 14920 |
| 9M | 3250 |
| 9N | 4302 |
| 9R | 2313 |
| 9W | 1569 |
| PE | 903 |
| PG | 856 |
| PH | 92 |
| PL | 43 |
| WG | 447 |
| WH | 312 |

**Figure 46. Soil Resource Inventory (SRI) Soil Types within the Rim-Paunina Planning Area**

**Land Suitability and Inherent Soil Productivity**

The suitable lands database for the Deschutes National Forest LRMP identifies areas of land which are considered to be suitable for timber production using criteria affecting reforestation potential (FSH 2490.13). This data was developed to designate a broad-scale timber base area for forest-wide planning purposes. Lands that do not meet these criteria are considered unsuitable or partially suitable for timber harvest due to regeneration difficulties or the potential for irreversible damage to resource values from management activities. Dominant landtypes within the Rim-Paunina 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.

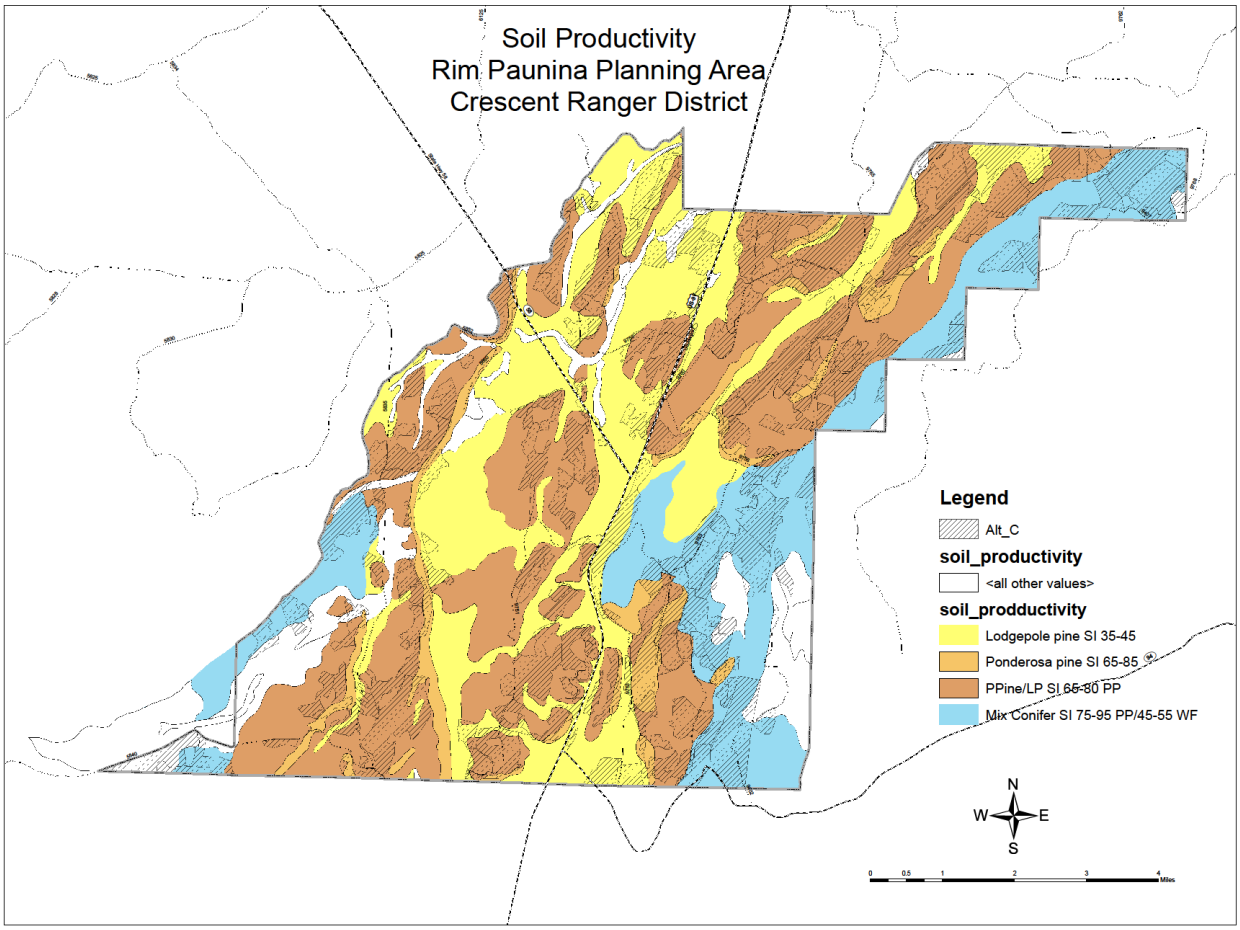



**Figure 47. Inherent Soil Productivity and Land Suitability**

**Sensitive Soil Types**

Based on criteria for identifying soil that are sensitive to management (Deschutes LRMP, Appendix 14, Objective 5), sensitive soils within the planning area include: 1) wet meadows, 2) high elevation drainages, 3) low areas that receive heavy frost, 4) low productivity high elevation slopes, 5) landscapes with slopes greater than 30 percent. Mapping units in the Deschutes Soil Resource Inventory (SRI) and concerns/opportunities within these soil types are displayed in Table 94 and Figure 48. Proposed treatments in areas of sensitive soil areas are discussed under the direct and indirect effects of implementing the management activities under the proposed action.

**Table 94. Soil Resource Inventory (SRI) Mapping Units Containing Sensitive Soils within the Rim-Paunina Planning Area (Soil Resource Inventory, Deschutes National Forest 1976)**

| SRI Map Unit Symbol | Geomorphology (Representative landforms) | Management Concerns/Opportunity |
|---|---|---|
| WH, 44, WG | Wet meadows and soils with seasonal high water tables | 1&2 |
| 2 | High elevation drainages with seasonal high water tables | 1&2 |
| 15, PH | Lodgepole basins with a high frost hazard | 3 |
| 9B, 9W | Low productivity higher elevation side slopes, lava plains, and plateaus | 4 |
| 10, 9B, 9N, 9R, 9W, PE, PG | Landscapes with slopes greater than 30% | 5 |

**Management Assumptions on Sensitive Soils**

1) There would be no tracked mechanized equipment operations on any wetted soils; permanent or seasonally. Storage and refueling requirements and other intoxicants for equipment is regulated by contract provision and would occur outside of RHCAs (INFISH RA-4).
2) Activities on soils within riparian areas have the potential for increased sediment delivery following soil disturbance. The only activities within riparian resources planned for the Rim-Paunina project is for the Five Mile Draw restoration and one area near Boundary Springs. Five Mile Draw is a very low velocity intermittently wet area with no connection to a flowing body of water; therefore it has a very low to non-existent potential for sediment transport.
3) There may exist an opportunity to enhance these areas and provide additional habitat for vegetation types that are rare on this landscape yet adapted sites that have soils with a high frost hazard.
4) Vegetation regeneration may be difficult in these areas due to shallow soils, cold temperatures and a short growing season.
5) Equipment operations on slopes greater than 30 percent has the potential to cause excessive soil displacement. Walker Rim is categorized as the portion of the Rim-Paunina Project where most of the 30 percent and steeper ground is to be found. All activities planned on Walker Rim are prescribed as “fuels only” and would consist of hand thinning of small diameter trees, hand piling and disposal followed by prescribed underburning. There would be no tracked mechanized equipment on Walker Rim.
6) Post sale activities (such as small diameter cutting and piling, post and poles, and fire wood) would not add to detrimental soils conditions calculated for Table 136 to Table 139 in Appendix C because operations would be on detrimentally disturbed areas and machinery is allowed one pass off of the designated system without causing additional compaction or displacement.
7) No sharp turning off of the skid trail for slashbusting machinery to minimize natural resource damage.

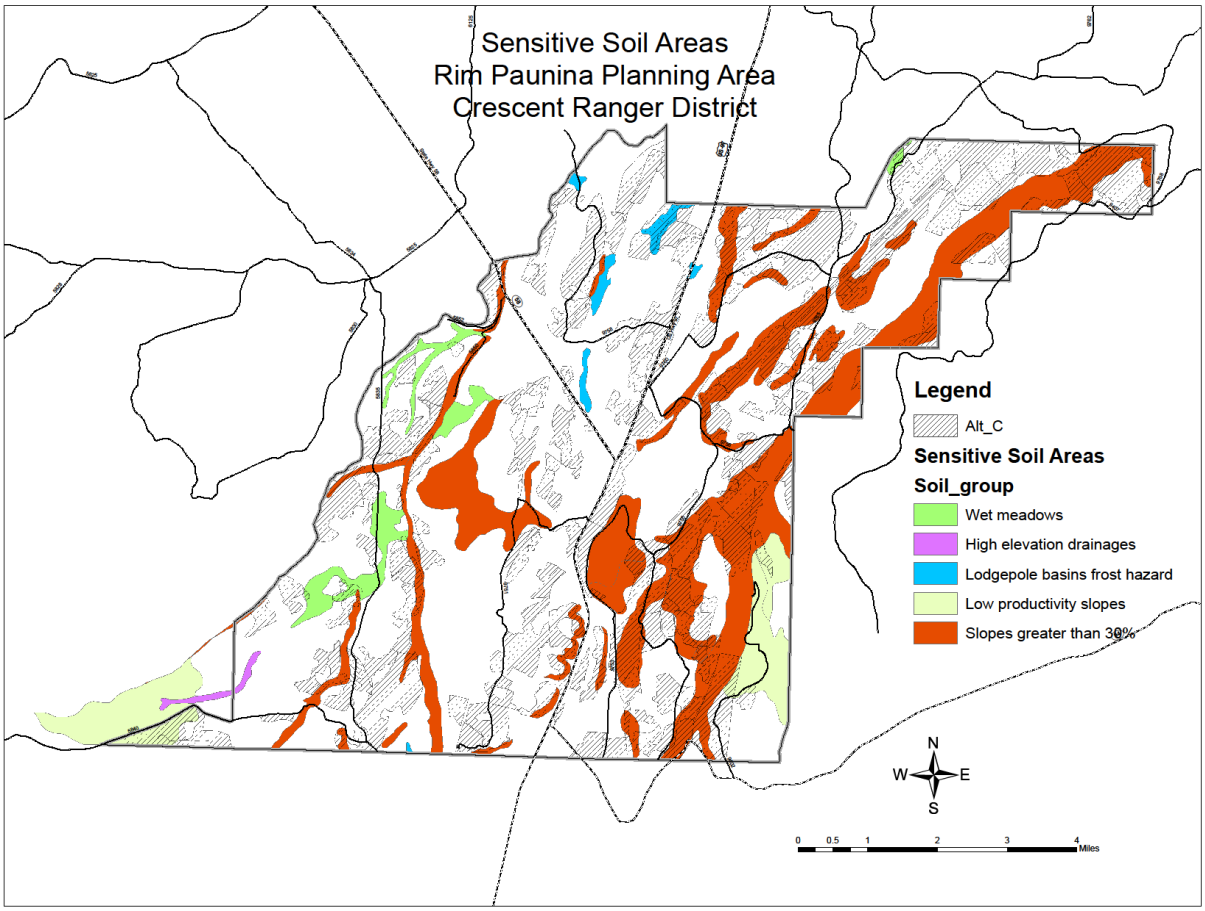



**Figure 48. Sensitive Soils Areas**

**Soil Productivity**

Maintenance of soil productivity is an objective for management of National Forest lands. When the forest is disturbed using equipment, soil can become displaced and compacted. The removal of trees and other vegetation can also potentially cause adverse changes in organic matter levels.

**Background:** 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 as defined in the US Forest Service Region 6 Soil Quality Standards (SQS) often occurs where heavy equipment or logs displace surface organic layers or reduce soil porosity and/or increase soil strength through compaction. These detrimental soil disturbances in turn 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. Therefore, an evaluation of the potential effects on soil productivity is essential for integrated management of forest resources.

**Measures:**

1) Change in extent of detrimental soil conditions following proposed harvest and mitigation treatments within the individual activity areas proposed for mechanical treatments.

2) Amount of coarse woody debris (CWD) and surface organic matter that would likely be retained to protect mineral soil from erosion and provide both short and long-term nutrient supplies for maintaining soil productivity on treated sites.
3) The probable success in project design and implementation of management requirements and mitigation measures that would be applied to minimize adverse impacts to soil productivity.

**Scope of the Analysis**
This section describes the rationale used to determine environmental effects in the soil section of the Rim-Paunina Environmental Analysis. The analysis is based upon an Environmental Effects Writing Training that was conducted by the US Forest Service in Bend, Oregon in March of 2007 (Glasford 2007). The focus of the training was to improve the documentation of environmental effects in project analysis, including conducting and documenting cumulative effects.

**ACE Model (Action/Change/Effect)**
The long term sustainability of forest ecosystems is dependent at least in part on the productivity and hydrologic functioning of soils. Forest thinning and fuel reduction treatments have the potential to cause soil disturbance and in turn affect the long term sustainability of forest ecosystems. 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 and water infiltration through compaction. Detrimental disturbances can reduce the soils ability to supply nutrients, moisture, and air that support soil microorganisms and the growth of vegetation. The biological productivity of soils also relates to the amount of surface organic matter and coarse woody debris retained or removed from affected sites. Therefore, an evaluation of the potential effects on soil productivity is essential for integrated management of forest resources.

**Magnitude of Disturbances (Extent/Distribution/Degree/Duration)**
Effects of soil disturbances on site productivity or hydrologic function of watersheds is dependent on the extent, distribution, degree and duration of the disturbance (Froehlich 1976; Snider and Miller 1985; Clayton et al. 1987; Seybold et al.1999). Extent refers to the amount of land surface occupied by the disturbance expressed as a percentage of a specified area. Distribution of soil disturbance within a management area may likely be more important than the actual estimated extent. The distribution of a soil disturbance can occur as small evenly disturbed polygons, or in large polygons in one or a few locations and that can have very different effects on the soil's ability to function. Degree refers to the amount of change in a particular soil property such as soil porosity, bulk density, or strength and the depth to which that change occurs, and the duration of a disturbance is the length of time disturbance effects persist.

Extent, distribution, and in some instances, degree of disturbance can be mitigated by imposing management constraints such as limiting season of operation, spacing of skid roads and trails, and number of equipment passes (Froehlich 1976). Degree and duration of effects are largely determined by inherent soil properties that influence resistance to, and ability to recover from, disturbance (Seybold et al. 1999). In some cases soil restoration activities are performed to shorten the duration of soil impacts. An example of a soil restoration activity would include subsoiling of compacted soils to accelerate their recovery (Powers et al. 1999).

**Bounding Spatial and Temporal Changes within the Zone of Influence**
The soil resource may be directly, indirectly, and cumulatively affected within each of the activity areas proposed for treatment within the planning area. An activity area is defined as "the total area of ground impacted by an activity and its feasible unit for sampling and evaluating" (FSM 2520 and LRMP p. 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. This is referred to as the "zone of influence." The discussion of soil effects and soil quality standards will be focused on the units proposed for treatments. There are 211 activity areas within the planning area ranging in size from four to 408 acres. Where appropriate and relevant, the effects discussion is expanded to the planning area to provide additional context and intensity.

**Methodology and Assumptions**

Quantitative analyses, literature reviews, 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 that include changes to soil properties that would generally revert to pre-existing conditions within five years or less. In addition the analysis considered the effectiveness and probable success of implementing the management requirements, mitigation measures, and Best Management Practices (BMPs) which are designed to avoid, minimize, or reduce potentially adverse effects to soil productivity.

**Existing Condition of the Soil Resource**

The current conditions of soils in the Rim-Paunina planning area are directly related to soil porosity and the quantity and quality of surface organic matter within the project area (Powers and Avery 1995). Ground-disturbing management activities (i.e., timber harvest, road building, recreation use, and livestock grazing) have caused some adverse changes to soil quality in previously managed areas, especially where mechanical disturbances removed vegetative cover, displaced organic surface layers, or detrimentally compacted the soil. The following measures were used to evaluate the existing and predicted amounts of detrimental soil conditions for each individual activity area planned for treatment.

**Detrimental Soil Disturbance**

***Natural Events***

There is currently no evidence of detrimental soil conditions from natural disturbance events within the Rim-Paunina planning area. No recent large wildfires have occurred within the planning area. Although fires have occurred in the past, enough time has passed since their occurrence that existing vegetation and forest litter are providing an adequate source of ground cover to protect mineral soil from water and wind erosion. There are no recent natural or management related landslides within the planning area. 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 Soil Disturbances***

The degree, extent, distribution and duration of soil disturbance can vary with the size and type of equipment used for forest vegetation management, the volume and type of material being removed, frequency of entries, soil type and the soil conditions when the activity takes place (Froehlich 1976; Adams and Froehlich 1981; Gent et al. 1984; Snider and Miller 1985; Clayton et al. 1987; Miller et al. 1986; Page-Dumroese 1993). Soil monitoring on local landtypes and similar soils have shown that typically around 20 percent of an activity area can be detrimentally disturbed by ground-based harvest systems (Deschutes Soil Monitoring Reports 1995, 1996, 1997, 1999, and 2005).

The primary sources of detrimental soil conditions are associated with the transportation systems 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. Mechanical disturbances include the removal of vegetative cover, displacement of organic surface soils, or compaction of the soil. 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). Due to the process of soil particle

bridging, described under the Affected Environment section, soils within the Rim-Paunina planning area are expected to be more resistant to soil compaction compared to other soils on the Forest. Thus a real extent of detrimental soil conditions within Rim-Paunina planning area is not expected to be as extensive as in other planning areas on the Forest.

Within the last decade a number of fuel treatment projects have been implemented within the planning area. Treatments have included the mowing of brush and the use of prescribed burning to both reduce fuels and provide a forest structure that would be more resistant to wildfires. Equipment used for these treatments is considerably smaller than that used to harvest timber and typically does not result in detrimental impacts to the soil resource. While prescribed burning does remove some of the surface organic matter, this process is a natural part of these ecosystems that historically experienced low-intensity fire. These types of treatments also help to reduce the risk of impacts to the soil resource that can result from a high intensity uncharacteristic fire that could occur as a result of lack of active management.

Based on the proportionate extent of overlap of previously disturbed areas and areas proposed for treatments, percentages of predicted detrimental soil conditions were determined and are displayed in Appendix C.

***Coarse Woody Debris (CWD) and Surface Organic Matter (SOM)***

The effects of management activities on soil productivity as well as other desired soil functions also depend upon the amounts of coarse woody debris (CWD) and surface organic matter (SOM) retained or removed on affected sites. It is expected that adequate amounts of coarse woody debris and surface organic matter currently exist to protect mineral soil from erosion and provide nutrients for maintaining soil productivity within the majority of activity areas within the larger planning area. There are some older activity areas, prior to LRMP direction (1990), where management activities likely resulted in less than desired amounts of CWD and SOM. In other portions of the project area, fire suppression has resulted in vegetation conditions that have fuel loadings in excess of historic conditions. Although current levels of CWD and SOM are not known for all activity areas, it is expected that previously managed areas have been improving towards optimum conditions as additional woody materials have accumulated through mortality, windfall, and recruitment of fallen snags over time. In addition, annual leaf and needle fall, small diameter branches, twigs and other forest litter have increased organic matter levels for soil nutrient cycling.

Due to the historical frequent fire occurrence within the ecological types in the planning area, most likely, there were historically not large amounts of CWD and SOM on these sites. Observations of prescribed burns indicate that recruitment of CWD and SOM is a significant process for maintaining adequate levels for desired soil functions. Prescribed fires commonly burn CWD on the ground while recruiting new materials through the killing of some trees as well as causing dead standing trees to fall to the ground. Observations indicate that through these processes CWD is maintained at an adequate level in areas of prescribed burns.

Conserving surface organic matter (i.e., organic materials such as pine needles, twigs and branches less than three inches in diameter) is also important for protection of 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. The management goal is to provide a balance between fuel management objectives that would reduce the risk of soil impacts that may result from wildfire and the maintenance of enough surface litter to maintain soil functions.

A balance between fuel management objectives and ensuring adequate amounts of CWD and SOM 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 CWD (greater than three 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.

**Project Design and Mitigation**

Cumulative levels of existing and predicted amounts of soil disturbance need to be considered to determine whether soil quality standards will be met following project implementation. For activity areas that have already been affected by previous management, project plans need to include options for avoiding, reducing, and mitigating adverse effects for project activities to meet the Regional Soil Quality Standards described below.

**Management Direction**

The Deschutes Land and Resource Management Plan (LRMP) specifies that management activities are prescribed to promote maintenance or enhancement of soil productivity by leaving a minimum of 80 percent of an activity area in a condition of acceptable productivity potential following land management activities (LRMP p. 4-70, SL-1 and SL-3). This is accomplished by following Forest-wide Standards and Guidelines to ensure that soils are managed to provide sustained yields of managed vegetation without impairment of the productivity of the land. 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. Operations would be restricted to existing logging facilities (i.e., skid trails, landings) and roads, whenever feasible.

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, which are designed to protect or maintain soil productivity. Detrimental soil effects are those that meet the criteria described in the Soil Quality Standards listed below.

<u>Detrimental Compaction</u> in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent, or more, over the undisturbed level.

<u>Detrimental Puddling</u> occurs when the depth of ruts or imprints is six inches or more.

<u>Detrimental Displacement</u> is the removal of more than 50 percent of the A horizon from an area greater than 100 square feet, which is at least five feet in width.

<u>Severely Burned</u> 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 form organic matter charring by heat conducted through the top layer.

The Regional supplement to the Forest Service Manual (FSM 2520, R-6 Supplement No. 2500-98-1) provides policy for planning and implementing management practices which maintain or improve soil quality. This Regional guidance 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.

When initiating new activities:

1. Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area (This includes 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.

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.

**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 Features, management requirements, and mitigation measures designed to minimize, avoid, or eliminate potential effects or rectifying effects 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.

### *Environmental Effects*
**Introduction**
The best information about the proposed actions was used in conjunction with the location of activities to analyze the potential effects on the soil resource. 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 effects to soil productivity.

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. After this discussion, the environmental effects are presented and tracked by the issue measures {detrimental soil disturbance, coarse woody debris (CWD), and surface organic matter (SOM)} used to evaluate the estimated effects on soil productivity.

**Important Interactions**
The proposed management activities include commercial and non-commercial harvest of forest stands combined with fuel reduction treatments to reduce stand densities and hazardous fuels. Trees would most likely be harvested mechanically using track-mounted harvesters and skidders with grapples used to drag trees along a skid trail. The thinning of non-commercial trees would either be accomplished manually using chainsaws or with the use of specialized low ground pressure machinery. Most of the slash generated from these activities would be machine piled and utilized and/or prescribed burned at the log landings. Management activities also include mechanical shrub and small tree treatments (mowing or mastication). These activities can be used interchangeably and the effects described would not change. The use of prescribed fire to reduce fuel loadings and treat the shrub layer is typically of low-intensity

with very few associated effects to the soil resource to display. Existing snags and down ponderosa pine logs would be retained in a mosaic of varying densities across the landscape for wildlife and soil productivity needs.

There would be no new construction of roads that would remain as classified system roads. Estimated distances of temporary road needed to allow access to some of the activity areas proposed for mechanical vegetation treatments are listed in Table 95. Many of these spur roads would consist of reopening short segments (100-10,000 feet) of old access roads from previous entries. These temporary roads would be closed and in some cases may be obliterated upon completion of the vegetation management activities.

In unit 25 there is approximately one mile of a non-system road of indiscriminate age that would be obliterated as it is tied to the meadow enhancement/restoration activities in Five Mile Draw. These non-system road restoration activities would not occur on any wetted portion of the RHCA, thus they would not change water quality or yield. The full effects are discussed in the Fisheries and Aquatics section of Chapter 3.

**Table 95. Estimates for Miles of Temporary Road to be Constructed for the Various Alternatives in Rim-Paunina**

| Alternative | Temporary Miles of Roads Constructed |
|---|---|
| **B** | 9.2 Miles |
| **C** | 6.5 Miles |
| **D** | 6.5 Miles |
| **E** | 8.3 Miles |

The effects of ground-based logging disturbances on soil productivity vary based on the soil type, types of silvicultural treatments, the duration of activities, and the amount of ground disturbance with each entry. The cumulative amount of soil effects also depends on the existing conditions prior to entry, the ability to reuse previously established landings and skid trail systems, types of equipment, amount of material removed from treatment areas, operator experience, and contract administration. Soil productivity monitoring on the forest has shown that detrimental soil conditions increase each time a stand is treated with mechanical equipment (Deschutes Soil Monitoring Reports 1996, 1997, and 1999). Even with careful planning and implementation of project activities, the extent of detrimental soil conditions has been shown to increase by 5 to 10 percent with each successive entry into a stand (Craigg 2000).

Under all action alternatives a combination of various fuel treatments would be implemented to reduce the potential for intense wildfires. Fuel treatments include thinning trees, mechanical piling, hand piling, burning slash materials, mechanical shrub/slash treatments (mowing and mastication), and the use of prescribed fire.

**Direct, Indirect and Cumulative Effects**

The magnitude and duration of potential effects, both physical and biological changes in soil productivity, depend on the intensity of site disturbance, the timing and location of activities, and the inherent properties of the volcanic ash-influenced soils within affected activity areas. Direct effects occur at essentially the same time and place as the actions that cause soil disturbance, such as soil displacement. Indirect effects occur sometime after or some distance away from the initial disturbance, such as increased runoff and surface erosion from previously compacted areas. Cumulative effects include all past, present, and reasonably foreseeable actions that cause soil disturbance within the same activity areas proposed with this project.

**Alternative A – Direct and Indirect Effects**
**Detrimental Soil Disturbance**
Under Alternative A (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 logging facilities for harvest and yarding operations. There would be no cumulative increase in detrimental soil conditions above existing levels. Although disturbed soils would continue to recover naturally from the effects of past management, the current extent of detrimental soil conditions would likely remain unchanged for an extended period of time.

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 A 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.

**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 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 intense wildland fires which may completely consume heavy concentrations of fuel and ground cover vegetation. High-to-extreme fire hazard and potential for excessive soil heating exists when downed woody debris exceeds 30 to 40 tons per acre (Brown et al. 2003). Intense ground-level fire would likely create areas of severely burned soil and increase the potential for accelerated wind 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.

**Project Design and Resource Protection Measures**
Under Alternative A, there would be no cumulative increase in detrimental soil conditions from the proposed management activities. Implementation of Project Design Features and mitigation measures would not be necessary.

**Alternatives B, C, D, and E – Direct and Indirect Effects**
The proposed management activities are identified in the Alternative Descriptions. Action alternatives use silvicultural treatments to provide a diversity of habitats for Management Indicator Species more in line with historical conditions to maintain and enhance existing late and old-structured stand characteristics, and encourage the development of such characteristics. The alternatives also apply prescribed fire to these fire-dependent ecosystems to create habitat conditions that allow fire to perform its natural ecological function and more closely mimic natural processes. Alternative treatments vary in

their habitat manipulation in that some alternatives favor species that prefer open ponderosa pine stands and others favor species that prefer denser, multi-layered stand conditions. The alternatives also vary in the way they address heavy infestations of dwarf mistletoe. The nature of the effects to the soil resource was previously described under the Environmental Effects section.

Under Alternatives B, C, D, and E the amount of disturbed soil associated with log landings and skid trails would be limited to the minimum necessary to achieve management objectives. Project Design Features, management requirements, and Best Management Practices (BMPs) built into alternatives are all designed to avoid or minimize potentially adverse effects to the soil resource. Compliance with LRMP standard and guideline SL-5 (LRMP 4-70) is addressed by using advanced logging systems on slopes greater than 30 percent, restricting numbers of equipment passes, using existing harvest transportation systems, and seasonal restrictions on wet areas. 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 would be implemented during and following project activities to meet the stated objectives for protecting and maintaining soil productivity. The Ranger District and Forest has had success using these practices and is assured they can be implemented by contract provision.

Soil restoration treatments would be applied to rectify impacts by reducing the amount of detrimentally compacted soil dedicated to specific management areas of the proposed 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 (Final Interpretations, Document 96-01, Soil Productivity, 1996), and Regional policy (FSM 2520, R-6 Supplement No. 2500-98-1) for planning and implementing management activities.

Under Alternative B, detrimental soil conditions would remain on 1,196 acres, followed by 1,163 acres in Alternative C; 1,160 acres in Alternative D; and 1,329 acres in Alternative E. These estimates are very conservative. All activities would be consistent with Forest and Regional standards and guidelines for soil productivity with no units that exceed the 20 percent disturbance standards (Table 136 to Table 139 in Appendix C). It is expected that enough fallen trees and other organic materials would be available after harvest activities to meet recommended guidelines for coarse woody debris retention in the short-term. Therefore, the proposed actions comply with Regional and LRMP standards and guidelines for maintaining soil productivity within all proposed activity areas without restoration (subsoiling).

**Detrimental Soil Disturbance**

The use of ground-based equipment for vegetation management treatments would increase the amount and distribution of soil disturbance within the proposed activity areas. However, due to the inherent resistance of the soils in this area to soil compaction and the design of all action alternatives practices, none of the activities areas would exceed the Forest plan standard of 20 percent detrimental soil disturbance following proposed treatment (Appendix C). 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. Mitigation and resource protection measures would be applied to avoid or minimize the extent of soil disturbance in random locations between main skid trails and away from log landings. Non-commercial thinning by hand felling small-diameter trees with chainsaws would not cause additional soil impacts because machinery would not be used for yarding activities.

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 disturbance, activity

area boundaries would be adjusted to prohibit equipment operations in portions of activity areas that contain extensive areas with slopes steeper than 30 percent (see Project Design Features for description of operations within small areas of slopes greater than 30 percent). It is expected that many of these sensitive areas would be included as untreated patches within and adjacent to the proposed units 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 five feet in width (FSM 2520). Smaller areas of soil displacement or the mixing of soil and organic matter would not constitute detrimental soil displacement. There would be no new construction of temporary roads or logging facilities on steep slopes or sensitive soils.

**Coarse Woody Debris (CWD) and Surface Organic Matter**

The measure for CWD and surface organic matter was 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 Section and Chapter 2 Mitigation). A minimum amount of 5 to 10 tons per acre of CWD on ponderosa pine sites and 10 to 15 tons per acre on mixed conifer or lodgepole pine sites is recommended to ensure desirable biological benefits for maintaining soil productivity without creating an unacceptable fire hazard.

The proposed harvest activities would reduce potential sources of future CWD, especially where mechanized whole-tree yarding is used in activity areas. However, harvest activities also recruit CWD to the forest floor through breakage of limbs and tops during felling and skidding operations. Existing down woody debris 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 the recommended guidelines for CWD retention.

Fuel reduction treatments would potentially 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 accumulations increase the risk of wildfire to unacceptable levels. If prescribed fire is recommended, 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 three inches in diameter, and charring does not substantially interfere with the decomposition or function of coarse woody debris (Graham et al. 1994). Any dead trees killed from prescribed burn treatments would 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 five years).

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.

**Project Design and Resource Protection Measures for All Action Alternatives**

The management requirements, mitigation measures, and project design elements built into the action alternatives are all designed to avoid, minimize, or rectify potentially adverse effects to the soil resource

from ground-disturbing management activities. Operational guidelines for equipment use are included in Project Design Features (PDFs) to provide options for limiting the amount of surface area covered by logging facilities and controlling equipment operations to locations and ground conditions that are less susceptible to soil impacts in random locations of activity areas.

Grapple skidders would only be allowed to operate on designated skid trails spaced on average 100 feet apart (11 percent of the unit area). The short-term effects of only two passes by specialized machinery off designate skid trails to cut trees are not expected to qualify as a detrimental soil condition. Natural processes, such as frost heaving and freeze-thaw cycles, can offset soil compaction near the soil surface.

All of the action alternatives propose mechanical harvest treatments on landtypes that contain sensitive soils. Table 94 lists landtypes that contain sensitive soil types. It is emphasized that only a portion of these landtype areas 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. Figure 48 shows locations where portions of the proposed activity areas overlap with sensitive soil areas. Equipment operations within areas of sensitive soils would be modified to protect these soils from excessive disturbance.

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. On steep pitches (slopes of 30 percent or steeper) less than 100 feet long, equipment would be permitted to make one pass out and one pass back to harvest trees. In other areas, directional felling of trees to skidtrails and/or line pulling would be utilized to harvest trees in areas of slopes greater than 30 percent.

Most of the slash generated from commercial harvest would be machine piled and burned on log landings and/or main skid trails. Equipment used for machine piling would operate predominately from existing skid trails to minimize additional soil disturbance caused by equipment leaving the trail, however, there would be occasions in which the equipment would be allowed to leave the trail and make one pass to pile large concentrations in areas that cannot be reached from existing trails. Small concentrations of slash that cannot be reached from the existing trail would be left in the unit and therefore off trail travel to pile slash concentrations is expected to be of limited extent thereby minimizing additional soil disturbance.

Proposed management activities also include hand treatments for reducing fuel accumulations. 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 both machine piles and 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.

Conservative estimates were used in Appendix C to account for the cumulative amount of surface area that could be potentially affected within activity areas. The cumulative effects to soils from this activity would be minor in comparison to harvest and yarding activities. 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.

Specialized machinery with attachments for mowing or grinding would be used in some units to reduce the height of tall shrubs and small trees to within four to six inches of the ground. Only brush and light fuels would be mowed leaving any large-diameter downed logs in place. 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 burning would be used to both reduce fuel loads and reintroduce fire for resource benefits. Prescribed burning activities are conducted at times and under conditions that maximize benefits while reducing the risk of resource damage. The degree of soil heating depends upon fuel type (grass, brush, trees), fuel density, nature of the litter and duff layers (thickness and moisture content), and burn conditions at the time of ignition. For the treatment areas proposed with this project, natural fuel accumulations 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. Much of the down-and-dead, firm lodgepole pine would be mechanically removed during commercial harvest operations. Ponderosa pine logs and existing snags would be retained to meet coarse woody debris requirements for wildlife habitat and soil productivity.

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 of 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. Fall burning would be conducted following brief periods of precipitation. Prescribed underburns in timber stands would be accomplished under carefully controlled conditions to minimize damage to standing trees.

It is anticipated that mechanical fuel breaks would be used in conjunction with existing roads and natural barriers to effectively control the spread of fire within treatment units. Hand lines may also be used to create smaller blocks within the larger activity areas. The extent of disturbed soil would be limited to the minimum necessary to achieve fuel management objectives.

Prescribed fire activities are planned to meet fuel and visual management objectives without exposing extensive areas of bare mineral soil through the complete consumption of surface organic matter. 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 detrimental changes in soil properties. The successful implementation of prescribed underburning would likely result in beneficial effects by reducing fuel loadings and wildfire potential as well as increasing nutrient availability in burned areas.

**Project Design Features Common to all Action Alternatives**

The following implementation guidelines are designed to avoid or minimize potentially adverse effects to soils by controlling equipment operations to locations and conditions that are less susceptible to resource damage. This type of mitigation is built into the action alternatives as part of the project design.

1. If site specific investigation determines soils that are mapped for seasonally wet are inaccurate, then restrictions on mechanical methods may be lifted.
2. Non-fish bearing streams and ephemeral streams would have one standard tree height or a 150 foot no-harvest buffer placed on either side of the stream except for those units specifically designed for riparian enhancement and restoration activities. In these areas, the Riparian Management Objective is to maintain the unique values associated with wet meadow habitats in the Five Mile Draw area. To accomplish this, some dead and downed material, as well as

encroaching lodgepole pine would need to be removed ("Exceptions" TM-1a and b, INFISH A-7).

3. Best Management Practices (BMPs) (USDA 1988) apply. Specific BMPs are for Timber Management (pp. 1-21), Road Systems (pp. 22-42), Fire Suppression and Fuels Management (pp.43-47), Watershed Management (pp. 48-55), and Vegetative Manipulation (pp. 71-73). These practices maintain the physical integrity of the aquatic system and in cooperation with the State of Oregon, are required to be followed in accordance with the Clean Water Act. For a complete list, see Appendix A, Management Direction.
4. 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 that erosion control structures are stabilized and working effectively (LRMP SL-1; Timber Management BMP T-16, T-18).
5. 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).
6. Minimize potential erosive effects of concentrated water through the proper design and construction of temporary roads (Road BMP R-7).
7. Conduct regular preventive maintenance to avoid deterioration of the road surface and minimize the effects of erosion (Road BMP R-18, R-19).
8. Retain adequate supplies of large woody debris (greater than 3-inches in diameter) to provide organic matter reservoirs for nutrient cycling following completion of all project activities (LRMP SL-1). It is recommended that a minimum of 5 to 10 tons per acre of coarse woody debris (CWD) be retained on dry, ponderosa pine sites and 10 to 15 tons of CWD per acre on mixed conifer sites to help maintain long-term site productivity.
9. The objective is to maintain existing sources of unburned or partially consumed, fine organic matter (organic materials less than 3-inches in diameter; commonly referred to as the duff layer) over a minimum of 50 percent of the prescribed burn unit. (LRMP SL-6; Fuels Management BMP F-2; Timber Management BMP T-13).
10. Maintain spacing of 100 to 150 feet for all primary (main) skid trail routes, except where they converge at landings. If closer spacing is necessary due to complex terrain, the Timber Sale Administrator must provide advance approval. Main skid trails spaced 100 feet apart will maintain soil quality on 89 percent of the unit area. For 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 maintain soil quality on 93 percent of the unit area (Froehlich 1981; Garland 1983). This would reduce the amount of surface area where restoration treatments, such as subsoiling, may be required to mitigate impacts and to achieve soil management objectives.
11. 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.
12. Avoid equipment operations during times of the year when soils are extremely dry and subject to excessive soil displacement.
13. Avoid equipment operations during periods of high soil moisture, as evidenced by equipment tracks that sink deeper than during dry or frozen conditions. An indication of potential detrimental disturbance would be identifiable when ruts, or indentations in the ground after equipment travel appears six inches in depth or greater.
14. When possible, 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).

15. Prevent additional soil effects 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. Equipment used for machine piling would operate predominately from existing skid trails to minimize additional soil disturbance caused by equipment leaving the trail, however, there would be occasions in which the equipment would be allowed to leave the trail and make one pass to pile large concentrations in areas that cannot be reached from existing trails.
16. On steep pitches (slopes of 30 percent or steeper) less than 100 feet long, equipment would be permitted to make one pass out and one pass back to harvest trees. In other areas, directional felling of trees to skid trails and /or line pulling should be utilized to harvest trees. This method applies to units that have a small amount of slopes over 30 percent in less than 10 percent of the unit area:
17. Reclaim or properly close all temporary roads by applying appropriate soil restoration treatments.

**Cumulative Effects**

Under Alternative A (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. The effects of past and current management activities were previously described under Existing Condition of the Soil Resource. Appendix C displays existing percentages of detrimental soil conditions for each of the activity areas. The overall amount of detrimentally disturbed soil combined with soil resource commitments to management facilities would remain at current levels (Appendix C). This alternative would defer opportunities for soil restoration treatments that reduce existing effects and help move conditions toward a net improvement in soil quality.

**Detrimental Soil Disturbance**

Implementation of Alternatives B, C, D, or E would cause some new soil disturbances where ground-based equipment is used for mechanical harvest and yarding activities during the current entry. The combined effects of past and current disturbances and those anticipated from implementing the proposed actions were previously addressed under existing conditions and in the discussion of direct and indirect effects. The primary source of detrimental soil conditions from past management are associated with existing roads and ground-based logging facilities which were used for past harvest activities. Likewise, the majority of project-related soil effects from this entry would also be confined to known locations in heavy use areas (such as roads, log landings, and main skid trails). Estimates of existing and predicted amounts of detrimental soil conditions are displayed in Appendix C. The net change in detrimental soil conditions is associated with additional logging facilities that would be retained following harvest or post-harvest soil restoration treatments.

The combined effects of slash disposal and other fuel reduction treatments are not expected to cause cumulative increases in detrimental soil conditions. Fuel reductions would mainly be accomplished by whole tree yarding and most of the logging slash would be piled and burned on log landings. Machine piling and burning of slash materials on temporary roads or main skid trails would not cause cumulative increases in soil disturbance because the piling and burning would occur on previously disturbed soils. Mechanical shrub and slash treatments would be accomplished using low ground-pressure machinery and soil disturbances form these activities are not expected to qualify as a detrimental soil condition. Monitoring results have shown that brush mowing activities would not increase the cumulative amount of detrimental soil conditions within activity areas (Soil Monitoring Report 1997). Slash disposal by hand piling and burning would not cause a measurable increase in detrimental soil conditions because machinery would not be used and burning small concentrations of slash materials is not expected to cause severely burned soil. Fuel reductions achieved through prescribed underburning in timber stands are

conducted at times and under conditions that result in low-to-moderate intensity burns that do not cause detrimental changes in soil properties.

**Coarse Woody Debris (CWD) and Surface Organic Matter**
Under Alternative A, the amount of coarse woody debris and surface organic matter would gradually increase over time. In the long term, the accumulation of CWD and forest litter would increase the risk for wildland fires.

As previously described for the direct and indirect effects, it is expected that the action alternatives would comply with the recommended management guidelines that ensure adequate retention of snags, CWD, and fine organic matter for surface cover, biological activity, and nutrient supplies for maintaining soil productivity on treated sites.

**Foreseeable Actions Common to All Alternatives**
Foreseeable future activities include continued recreation use, standard road maintenance, and prescribed maintenance burning to reduce fuel densities and the risk for future wildland fires.

The effects of recreation use would be confined mainly to small concentrated areas that would have a relatively minor effect on overall site productivity. Effects for 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 minor soil-related concerns associated with the combined effects of these future activities.

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 all action alternatives. 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 both water and plant nutrient availability in burned areas.

# Recreation

**Existing Condition/Facilities**

The following is a discussion of the recreation specialist report in its entirety. The zone if influence for the direct and indirect effects is the Rim-Paunina project area.

There are limited developed recreation opportunities within the Rim-Paunina project area compared to other more heavily visited places on the Crescent Ranger District. The only developed recreation site is at Boundary Springs near Walker Rim, which has a bathroom and user-defined sites. There are no other amenities such as picnic tables or fire pits. Although it is depicted as a developed site on the Deschutes National Forest Recreation map, visitors experience dispersed camping with no fees and few restrictions. The site receives seasonal use, mostly with OHV enthusiasts in the springtime and big game hunters in the fall/winter. It is apparent that the local community is fond of the area and in addition to periodic visits from the Forest Service field rangers, the campers perform a certain amount of stewardship activities such as picking up litter and prevention of vandalism associated with other similar remote areas on the forest. Immediately adjacent to the east are lands designated for Old Growth Management in a mixed conifer plant association along Walker Rim, and to the north is the new Gilchrist State Forest interspersed with lands that are privately owned and managed in trust for Old Growth values associated with ponderosa pine.

The Recreation Opportunity Spectrum (ROS) in the Boundary Springs site is for Roaded Natural and Semi-Primitive Motorized dependent upon the season of use. Roaded Natural is characterized by a predominately natural-appearing environment with moderate evidence of the sights and sounds of humans. Semi-Primitive Motorized is characterized by a setting that is natural-appearing, concentration of users is low, and the area is managed with minimum on site controls.

In addition to Boundary Springs developed site, the most popular recreation experience visitors seek in the Rim-Paunina area is likely dispersed camping, which includes 23 inventoried traditional use sites (Figure 49). Visitation is considered high during hunting season and holidays (especially Fourth of July, Labor Day, and Memorial Day). The camping experience within the dispersed sites is largely unregulated with no fee and few restrictions. In Figure 49, Rim-Paunina proposed activity areas are overlaid onto the traditional camping sites. The Boundary Springs campground is in the vicinity of the northeast corner of the project area. Typically, the campers that traditionally camp in the Walker Rim area are very aware of forest management practices because they may live nearby National Forest system lands, and/or are employed in a forest industry job. Although active forest management on private and federal lands has recently overlapped the camping season, the Crescent Ranger District has received very few (if any) documented complaints from campers as a result of ongoing forest activities such as thinning and fire management.

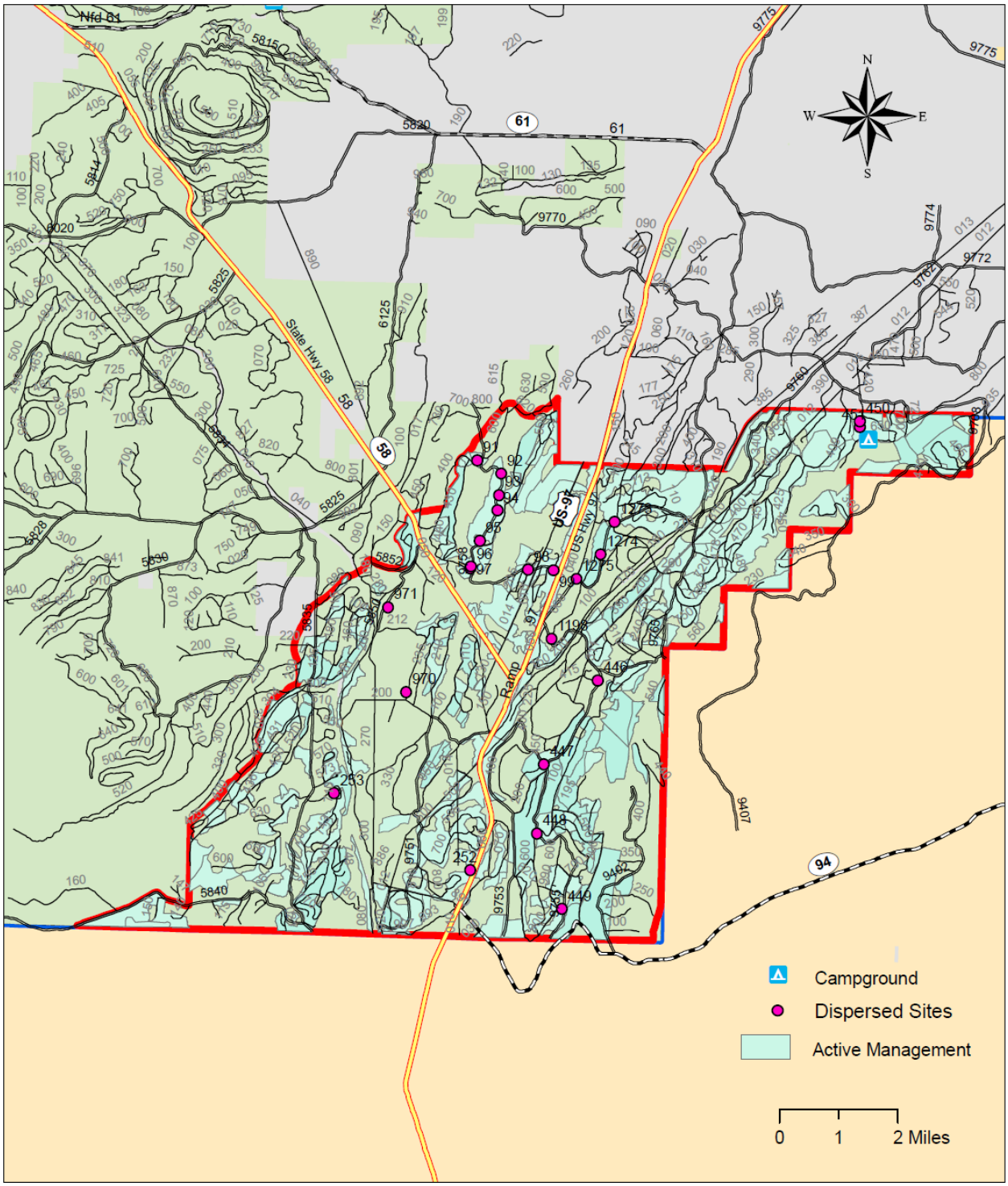



**Figure 49. Inventoried Dispersed Traditional Camping Sites in the Rim-Paunina Project Area**

The Three Trails OHV area is a designated motorized trail that overlaps the Rim-Paunina area with Class I, II, and III trails. These trails vary from dual use roads to trails and routes that are scheduled to begin construction in 2012. There are 87 miles of trail planned in the vicinity of the Two Rivers North

subdivision area and 14 miles in the Walker Mountain area for a total of 101 miles. The following estimates the use in the two segments that overlap the Rim-Paunina Project:

> "… in the Two Rivers North area, there are approximately 100 riders during average summertime weekends. This estimate is based on numbers of vehicles with trailers parked in established areas, number of people with OHVs observed camping, interviews with local business owners and OHV club members, and the number of residents that likely ride from their residences. On the holiday weekends of Memorial Day, the 4th of July, and Labor Day, it is estimated that rider numbers double to approximately 200 riders as people visit those that have a house in the subdivision as well as non-local riders that disperse camp or stay in a developed campground around Crescent Lake. It also is estimated eighty percent of them originate from the Two Rivers North subdivision with the remainder from non-local areas.
>
> In the Walker Mountain area, use outside of hunting season is estimated to be 50 riders on a typical weekend. These users originate from the communities of Crescent/Gilchrist and from Chemult to the south. Local riders also traverse the area on their way to the Fremont-Winema National Forests. Other than local use, some use originates from mostly self-contained recreational vehicles (RVs) campers using the Boundary Springs camping area. The Forest Service estimates that use doubles to around 100 riders during the hunting season (October-November), when approximately 21 inventoried dispersed sites east of Highway 97 and at the base of Walker Mountain are occupied with multiple OHV machines (Three Trails OHV Project Final Environmental Impact Statement, pages 88-89, 2010)."

Snowmobile use is also prevalent particularly along road 5835 that is maintained and groomed as the Chemult Run trail and road 5840 that is called the Deer Creek Loop trail. Currently, the 2009 Deschutes National Forest Commercial Road Rules list road 5835 as restricted for plowing and vehicle use from December 1 through March 31. Road 5840 does not have those restrictions.

Although mushroom habitat is limited in the Rim-Paunina area, harvesters in the fall use road 94 for access to commercial picking on both the Deschutes and the Fremont-Winema National Forests.

## *Environmental Consequences*

**Direct and Indirect Effects**
**Alternative A**
Alternative A would continue the status quo for vegetation within the analysis area. Custodial activities such as suppression of wildfires and maintenance of roads would continue. The public who use the area for dispersed camping and activities associated with motorized use in winter and summer seasons would not be affected by this alternative.

**Alternatives B-E**
At Boundary Springs, there are no overlapping commercial harvest or prescribed underburning units within the camping site. However, all of the action alternatives have activity planned for the perimeter of the campground for a potential duration of approximately five years. In Alternatives B through E, there would be a prescription in unit 640 for an improvement cut (HIM). This would increase the prevalence of ponderosa pine while decreasing the lodgepole pine component. Then, prescribed fire would be applied with a likely periodic return every 8 through 15 years. Prescriptions would maintain the largest trees and would appear more open than in the current condition.

For some visitors that use the Boundary Springs area, there may be a perception the quality of their recreation experience has somewhat diminished because of the nearby forest management activities

planned in the action alternatives. However, for most visitors that have used the site in the past, their recreation experience would not likely change, as they are knowledgeable of active forest management practices. As recent as the fall of 2010, thinning of stands similar to those activities proposed in Rim-Paunina was accomplished by an adjacent private land holder. Also, throughout the Walker Mountain area, execution of prescribed burning operations on federal lands frequently overlaps periods when visitors are using dispersed camping sites. The following Project Design Features were developed to maintain safety and a quality recreation experience for those visiting the Walker Mountain area. They have proven to be effective in the past with similar forest activities as proposed in the Rim-Paunina area:

- During rifle hunting season, all hauling associated with timber harvest would honor agreements with the green dot system and access management restrictions for motorized vehicles.
- Prescribed burning operations are generally discouraged during rifle season and overlapping high visitation weekends such as Memorial Day and Fourth of July.
- To maintain a quality camping and hunting experience, during the green dot road closure period associated with two-week rifle deer season, harvest operations and prescribed burning would be suspended in the immediate vicinity of designated campgrounds, including Boundary Springs (Unit 640).
- Sign Boundary Springs campground, motorized trails at appropriate locations, and at staging areas.
- Utilize the physical presence of field rangers at key locations, especially during firing and mop-up phases.
- Utilize public notification in media, the Forest Service Web Portal, the COHVOPS website, and other appropriate venues such as organized motorized vehicle clubs.
- Warning signs would be posted at prominent road junctions to inform the public of prescribed burning operations, and would remain in place until there is no visible smoke. If feasible, roads and trails may be temporarily closed for the protection of public safety.
- As part of the plan to inform the public, notify local businesses prior to the burning season and on the day of planned prescribed burning operations. Also, notify adjacent landowners of burning operations conducted in units within ¼ mile of their property.
- Coordinate with appropriate partners, such as the Oregon Department of Fish and Wildlife to incorporate information regarding prescribed burning operations in publications such as the hunting regulations and hunter booth hand outs.

Of the 23 inventoried dispersed camping sites, between 15 and 17 of them (depending on alternative) would be overlapped by commercial thinning operations and/or prescribed burning. In addition to the prescribed burning education and information system in place, a Project Design Feature was designed to maintain the character of inventoried dispersed camping sites (Figure 49) by retaining the largest trees onsite and locating landings and skid trails away from the dispersed sites. Similar to effects disclosed for Boundary Springs, those camping in a dispersed site overlapped by ongoing forest management would likely continue to use the site because of familiarity with forest management practices and Project Design Features that would maintain the features that would draw a traditional camper year after year.

Reference the Big Game section in this chapter for a discussion how Rim-Paunina activities affect Executive Order 13443 intended to enhance hunting opportunities on federal public lands.

In addition to those activities predicted to overlap dispersed camping, some activities also have potential to affect motorized travel, both snowmobile and OHV. Snowmobile use is prevalent in the area particularly along road 5835 that is maintained and groomed as the Chemult Run trail and road 5840 that is called the Deer Creek Loop trail. A mitigation measure would be implemented to seasonally restrict (between December 1 and March 31) harvest operations and haul routes in units accessed by Forest

Service roads 5835 and 5840 to protect access and quality of winter snowmobile trails and to maintain safety of users.

If portions of the Three Trails OHV designated trail system and shared use roads overlap felling and hauling operations, they may be temporarily closed during operational periods of the timber harvest for a period up one year. If the overlap occurs during prescribed burning operations, portions of the trail system would be closed on burn days due to reduced visibility and hazards associated with potential exposure to fire and equipment. Project Design Features include a strategy to notify potential visitors by posting information on the central Oregon website, signing, and presence of field rangers at staging areas and affected trail systems until the hazard is abated. Although these activities have the potential to displace visitors, there would be more than approximately 2/3 of the trail system remaining for their use. In addition, a mitigation measure would be implemented to include coordination between the resource specialists, presale specialists, and the Central Oregon Off-Highway Vehicle Operations (COHVOPS) specialist to ensure adequate buffers and 'pivot' trees are retained prior to harvest and/or burning activities to ensure the long-term quality of the Three Trails OHV trail system.

Active forest management activities also have potential to change the scenery as viewed from the motorized trail system. Stands using prescriptions for thinning (HTH) and improvement (HIM) would appear more open with discrimination towards retention of individual trees with full crowns. Also, larger ponderosa pine would be a more dominant component, especially where lodgepole pine and other fire intolerant species are intermixed. Particularly in Alternative D, approximately 778 acres of openings ranging from 2-5 acres created by aggressive mistletoe prescriptions would remove every visibly infected tree regardless of size. In these areas, evidence of active forest management would be the most apparent to all visitors, with a duration of approximately 10 years until the stand is successfully regenerated with trees and other vegetation.

**Cumulative Effects**

There are no other past, present, or foreseeable actions that overlap the project area in space and time with potential to affect recreation. Implementation of the Travel Management Project would affect how users access the area; however the Rim-Paunina project does not affect access except for relatively short-term and localized closures associated with public safety. Effects described under the heading Direct and Indirect would not change.

# Botany

## Threatened, Endangered, and Sensitive (TES) Plant Species

### Introduction

The following analysis for botanical resources hereby incorporates the specialist report in its entirety. The zone of influence for bounding the effects is the project area.

Sensitive plants are those species identified by a U.S. Forest Service Regional Forester for which population viability is a concern, as evidenced by a significant current or predicted downward trend in either population numbers or density, or in habitat capability that would reduce a species' existing distribution (Forest Manual 2670.5). The sensitive species list for Region 6, Pacific Northwest, was last updated on January 31, 2008. This list includes vascular plants and non-vascular species such as bryophytes (mosses and liverworts), fungi (e.g. mushrooms), and lichens.

Threatened and endangered plants are those species whose viability is of concern and have been identified as such by either State and/or Federal agencies. Within Oregon, the State and Federal designations for rare plants are listed by the following agencies: Oregon Department of Fish and Wildlife, Oregon Department of Agriculture, and U.S. Fish and Wildlife Service.

### Management Direction

The purpose of the Biological Evaluation (BE) is to comply with requirements of the Forest Service Manual (USFS 1995b), the Land and Resource Management Plan for the Deschutes National Forest (LRMP) (USFS 1990), and the Endangered Species Act of 1973, as amended. These documents state that habitat for sensitive plant and animal species shall be managed or protected to ensure that the species do not become threatened or endangered. The Forest Service Manual also states that habitats for all existing native and desired non-native plants, fish, and wildlife should be managed to maintain at least viable populations for each species (USFS 1995a). The Rim-Paunina planning area is outside of the boundaries for the Northwest Forest Plan (NWFP USDA/USDI 1994); therefore Survey and Manage requirements do not apply for this planning area.

### Pre-field Review

The pre-field review consisted of checking existing records for documented occurrences of any endangered, threatened, or sensitive plant species. The pre-field review incorporated the following data sources:

- Regional Forester's (R-6) Sensitive Plant Species List (updated January 31, 2008)
- Oregon Biodiversity Information Center: Rare, Threatened and Endangered Species of Oregon(OBIC 2010)
- NRIS (Natural Resource Inventory System) database for the Deschutes National Forest: Element Occurrence records for TES plants and noxious weeds (updated November 2011)
- Geographical Information System (GIS) Sensitive Plant and Noxious Weed layer for the Deschutes National Forest (updated 3/1/2010)
- Botany Survey Records, Crescent Ranger District (updated November 2011)

Pre-field reviews of existing records were conducted in March 2009 for the Rim-Paunina planning area. The results of these reviews indicated there were no documented occurrences of Federal proposed, endangered, or threatened plant species within the project area.

**Survey Methods and Results**

Botanical surveys of the Rim-Paunina planning area were conducted during July and August of 2006 and 2007. The intuitive-controlled method was used to survey for sensitive plant species that were documented or suspected to occur on the Deschutes National Forest, as listed in Table 96. Surveys were conducted within the designated treatment units for the project, with noxious weed surveys conducted simultaneously. No TES plant species were documented during these surveys.

On April 15, 2010, an incidental field survey of the wet meadow area within Rim Paunina Unit 205 resulted in the discovery of tomentypnum moss (*Tomentypnum nitens*), which is a Region 6 Sensitive species. It is estimated that several thousand individuals of this species were in a wetland area approximately ¼ acre in size.

**Existing Conditions**

***Potential Habitat for Sensitive plant species***

In reviewing the Sensitive plant list and associated habitats, it was determined that the following species had moderate habitat potential within the Rim-Paunina planning area: *Alpova alexsmithii* (fungus), *Astragalus peckii* (Peck's milkvetch), *Castilleja cholorotica* (green-tinge paintbrush), *Eucephalus gormanii* (Gorman's aster), *Tomentypnum nitens* (moss), and *Ramaria amyloidea (coral mushroom)*. With the exception of the sequestrate (e.g. fruiting below-ground) *Alpova alexsmithii* species, these are plant and fungal species that are found above-ground and can be easily seen during field surveys. Extensive botany surveys were conducted in 2006 and 2007. Of the six species listed above, only the fen moss *Tomentypnum nitens* was found.

***Known Sensitive Plant Occurrences***

Of the 74 species listed on the Deschutes/Ochoco Sensitive Plants list, there are two species that have been documented within the project area: pumice grape-fern (*Botrychium pumicola*) and tomentypnum moss (*Tomentypnum nitens*). A discussion on the ecology and existing condition of these species is provided below.

**Table 96. Pre-Field Review Summary of 2008 Sensitive Plant List for the Rim-Paunina Planning Area**
(Note: The species highlighted in grey have documented occurrences within the project area; those species listed in bold have moderate habitat potential, but no known occurrences.)

| R6 Sensitive Plant Species Documented or Suspected on the Deschutes National Forest | Range | Habitat | Known Occurrence within Project Area? Within the District? | Probability of Occurrence in Project Area |
|---|---|---|---|---|
| *Agoseris elata* (vascular plant) | Washington and Oregon Cascades | Forest openings and forest edges adjacent to wet/moist meadows, lakes, rivers, and streams | No/No | Low; habitat marginal |
| ***Alpova alexsmithii* (fungus)** | **Cascades, Central OR to WA** | **Associated with various Pinaceae sp., incl. Pacific silver fir, lodgepole, Engelmann spruce, and mountain hemlock** | **No/Yes** | **Moderate; suitable habitat present** |
| *Arabis suffrutescens* var. *horizontalis* (vascular plant) | South-Central Oregon | Meadows, woods, summits, ridges, and exposed rock outcrops | No/No | Low; outside known range |
| *Arnica viscosa* (vascular plant) | South-Central Oregon Cascades, California | Scree, talus gullies, lava flows and slopes w/ seasonal runoff. May be in moraine lake basins or crater lake basins | No/No | Low; habitat marginal |
| ***Astragalus peckii* (vascular plant)** | **South-Central Oregon** | **Basins, benches, gentle slopes, and meadows.** | **No/Yes** | **Moderate; possible habitat with *B. pumicola*** |
| *Barbilophozia lycopodiooides* (liverwort) | Circumboreal, south to Oregon and Idaho | High elevation peaks, peaty soil | No/No | None; no habitat present |
| ***Botrychium pumicola*** (vascular plant) | Central Oregon | Alpine-subalpine ridges, slopes, and meadows. Lodgepole forests in basins with frost pockets, pumice flats | **Yes/Yes** | **14 known occurrences in Rim area** |
| *Brachydontium olympicum* (moss) | Alaska through Oregon, Cascade Mountains | Subalpine to alpine boulder fields, moraines and cliff faces | No/No | None; no habitat present |
| *Calamagrostis breweri* (vascular plant) | Oregon North Cascades and California | Non-forest moist-to-dry subalpine and alpine meadows, open slopes, streambanks, lake margins | No/No | None; no habitat present |
| *Carex abrupta* (vascular plant) | Oregon, California, Nevada | Montane, forests, meadows and open slopes. Usually dry soils | No/No | Low, habitat marginal |
| *Carex capitata* (vascular plant) | Circumboreal | Wet meadows, fens and bogs | No/Yes | Low; no work in riparian areas |
| *Carex diandra* (vascular plant) | Circumboreal, south to California | Swamps, sphagnum bogs, lake margins | No/No | Low; no work in riparian areas |
| *Carex lasiocarpa var. Americana* (vascular plant) | S Cascades of Washington, Idaho, Montana, Utah, irregularly to Oregon | Mid elevation swamps and wet meadows | No/Yes | Low; no habitat present |
| *Carex livida* (vascular plant) | Oregon Washington, California, Idaho | In peatlands, including fens and bogs; wet meadows with still or channeled water | No/No | Low; no work in riparian areas |
| *Carex retrorsa* (vascular plant) | Nevada, Oregon, Washington, Idaho, to the north and east | Bogs, swamps, wet meadows, stream margins | No/No | Low; no work in riparian areas |
| *Carex vernacula* (vascular plant) | Washington, Oregon, California, Idaho | Alpine, moist meadows, open slopes | No/No | None; no habitat present |
| ***Castilleja chlorotica* (vascular plant)** | **Oregon east Cascades** | **LP-PP, mixed conifer forest openings. PP at lower and LP at mid, and mixed conifer at highest elevations** | **No/No** | **Moderate; suitable habitat may be present** |
| *Cheilanthes feei* (vascular plant) | Widespread western states, barely in Oregon | Limestone rocky areas | No/No | Low; no work on rocky outcrops |
| *Chyloscyphus gimmiparis* (liverwort) | Oregon, Alaska, Utah | High elevation montane streams, aquatic | No/No | Low; no habitat present |

| R6 Sensitive Plant Species Documented or Suspected on the Deschutes National Forest | Range | Habitat | Known Occurrence within Project Area? Within the District? | Probability of Occurrence in Project Area |
|---|---|---|---|---|
| *Collomia mazama* (vascular plant) | South-Central Cascades, Oregon | Meadows (dry to wet, level to sloping); stream banks and bars, lakeshores and vernal pool margins; forest edges and openings; alpine slopes | No/No | Low; outside known range |
| *Conostomum tetragonum* (moss) | Circumboreal; from BC through California | Subalpine to alpine boulder fields, moraines, and cliff ledges | No/No | None; no suitable habitat |
| *Cyperus acuminatus* (vascular plant) | Western states, west cascades Oregon | Margins wet areas, lake edges | No/Yes | Low; no work in riparian areas |
| *Cyperus lupulinus* ssp.*lupulinus* (vascular plant) | Idaho, Eastern Washington, Oregon | Rocky slopes adjacent to streams, low elevation | No/No | Low; marginal habitat |
| *Dermatocarpon luridum* (lichen) | Oregon, Washington | On rocks or bedrock in streams or seeps, usually submerged or inundated for most of the year | No/No | Low; no work in riparian areas |
| *Elatine brachysperma* (vascular plant) | Washington, Oregon, California, Nevada | Wet to drying muds | No/No | Low; no work in riparian areas |
| ***Eucephalus gormanii* (vascular plant)** | **Northern West Cascades** | **Rocky ridges, outcrops, or rocky slopes** | **No/No** | **Moderate; suitable habitat may be present** |
| *Gastroboletus vividus* (fungus) | Rogue River N.F., Crater Lake NP, CA | Associated with the roots of Pinaceae sp. such as Shasta red fir and mountain hemlock | No/No | Low; outside known range |
| *Gentiana newberryi* var. *newberryi* (vascular plant) | Oregon east and west Cascades, California | Wet to dry alpine, subalpine, and mountain mixed conifer zones, in forest openings and meadows, commonly with tufted hairgrass | No/No | Low; habitat marginal |
| *Helodium blandowii* (moss) | Circumboreal, south through Cascades to Sierra Nevada, and through Rockies to Arizona | Montane fens with calcareous groundwater. | No/Yes | None; restricted to fen habitats |
| *Heliotropium curassavicum* (vascular plant) | Western United States | Alkaline, saline playas, receding ponds and clay soils | No/No | Low; no work in riparian areas |
| *Helvella crassitunicata* (fungus) | Cascades, central Oregon to northern WA | On soil, along trails in montane regions with sp. such as Pacific silver fir, grand fir, and mountain hemlock | No/No | Low; suitable habitat not present |
| *Hygrophorus caeruleus* (fungus) | Cascades, central Oregon (Jefferson Co.) to central WA | On soil in association with roots of Pinaceae sp. near melting snowbanks | No/Yes | Low; outside known range |
| *Leptogium cyanescens* (lichen) | Oregon, Washington | Generally riparian but recently documented in upland settings on vine maple, big leaf maple and Oregon white oak | No/No | Low; no work in riparian areas |
| *Lipocarpha aristulata* (vascular plant) | Washington, Oregon, California, Idaho | Low elevation streamsides, gravel bars | No/No | Low; no work in riparian areas |
| *Lobelia dortmanna* (vascular plant) | Oregon East Cascades, Washington | Shallow water at margins of lakes, ponds, and rivers or in standing water of bogs and wet meadows | No/No | Low; no work in riparian areas |
| *Lycopodiella inundata* (vascular plant) | Oregon, Idaho, California, Montana – Circumboreal | Deflation areas in coastal backdunes; montane bogs, including sphagnum bogs; less often wet meadows | No/Yes | Low; restricted to lakeshore habitats |
| *Lycopodium complanatum* (vascular plant) | Oregon, Idaho, Washington | Edges of wet meadows; dry forested midslope with >25% canopy cover | No/No | Low; habitat marginal, outside known range |
| *Muhlenbergia minutissima* (vascular plant) | Western United States | Thin lava soils, associated with Typha, sedges | No/No | Low; habitat unlikely |

| R6 Sensitive Plant Species Documented or Suspected on the Deschutes National Forest | Range | Habitat | Known Occurrence within Project Area? Within the District? | Probability of Occurrence in Project Area |
|---|---|---|---|---|
| *Ophioglossum pusillum* (vascular plant) | Oregon, Washington, California, Idaho | Dune deflation plains; marsh edges; vernal ponds and stream terraces in moist meadows | No/No | Low; no work riparian areas |
| *Penstemon peckii* (vascular plant) | Central Oregon east Cascades | PP openings, open PP forests; mixed conifer openings; recovering fluvial surfaces | No/Yes | Low; outside known range |
| *Pilularia americana* (vascular plant) | Oregon, California | Alkali and other shallow vernal pools, not recently used stock ponds, reservoir shores | No/No | Low; no work in riparian areas |
| *Polytrichum sphaerothecium* (moss) | East Asia-Western North America through Alaska to Oregon; highest Cascade peaks | Subalpine to alpine, forming green to brown sods on igneous rocks in exposed or sheltered sites. | No/No | Low; no suitable habitat |
| *Potamogeton diversifolius* (vascular plant) | Oregon, Idaho, Nevada, California | Aquatic, Pond edges, | No/No | Low; no work in riparian areas |
| *Pseudocalliergon trifarium* (moss) | Circumboreal; British Columbia, Alberta, Montana, Oregon | Montane fens, submerged to emergent or on saturated ground, usually in full sunlight | No/No | Low; restricted to fen habitats |
| ***Ramaria amyloidea* (fungus)** | **Central OR Cascades (Willamette and DES NF); WA Cascades, NW CA** | **Mycorrhizal with true firs, Douglas fir, and western hemlock in humus or soil.** | **No/Yes** | **Moderate, suitable habitat may be present** |
| *Rhizomnium nudum* (bryophyte) | Oregon, Washington | Moss found in moist coniferous forests. On DNF associates include lodgepole pine, Engelmann spruce, mountain hemlock, and western white pine | No/Yes | Low; suitable habitat not present |
| *Rorippa columbiae* (vascular plant) | Oregon, California, Washington | Wet to vernally moist sites in meadows, fields, playas, lakeshores, intermittent stream beds, banks of perennial streams, along irrigation ditches, river bars and deltas, roadsides. | No/Yes | Low; suitable habitat unlikely |
| *Rotala ramosior* (vascular plant) | Washington, Oregon, California, Idaho | Low elevation low gradient shores, pond edges, river bars | No/No | Low; restricted to riparian areas |
| *Scheuchzeria palustris* var. *americana* (vascular plant) | Oregon, Washington, California, Idaho | Open to canopied bogs, fens, and other wetlands where often in shallow water | No/No | Low, restricted to fen habitats |
| *Schistostega pennata* (bryophyte) | Oregon, Washington, circumboreal | Mineral soil in crevices on lower and more sheltered parts of root wads of fallen trees near streams or other wet areas | No/Yes | Low; restricted to specific damp, rootwad habitat |
| *Schoenoplectus subterminalis* (vascular plant) | Oregon, Washington, California, Idaho | Generally submerged to emergent in quiet water 2-8 decimeters deep, in peatlands, sedge fens, creeks, ditches, ponds and lakes | No/Yes | Low; restricted to aquatic habitats |
| *Scouleria marginata* (bryophyte) | Pacific Northwest endemic; Oregon, Washington, Idaho, northern California, southwestern British Columbia | Exposed or shaded rocks in streams; seasonally submerged or emergent | No/No | Low; restricted to aquatic habitats |
| *Splachnum ampullaceum* (moss) | Circumboreal; from Alaska through Oregon, and Alberta | Peatlands, wetlands, on old ungulate dung | No/No | Low; restricted to wetlands |
| *Texosporium sancti-jacobi* (lichen) | Western North America | In Oregon, late seral dry shrub/grassland | No/No | Low; no habitat in project area |
| ***Tomentypnum nitens* (moss)** | Circumboreal, Alaska through Oregon | Montane fens at slightly elevated (stumps, logs, hummocks) | **Yes/Yes** | **Low; restricted to fen habitats** |

| R6 Sensitive Plant Species Documented or Suspected on the Deschutes National Forest | Range | Habitat | Known Occurrence within Project Area? Within the District? | Probability of Occurrence in Project Area |
|---|---|---|---|---|
| *Trematodon boasii* (moss) | British Columbia through California, Japan, Newfoundland | Subalpine stream, trail and pond edges. | No/No | Low; no suitable habitat present |
| *Tritomaria exsectiformis* (liverwort) | Alaska through Oregon, to Montana, Wyoming and Colorado | Open to shaded coniferous forest along perennial flowing water from springs and seeps | No/Yes | Low; no fen habitat |
| *Utricularia minor* (vascular plant) | Western United states north through Canada | Aquatic plant of pools, ponds, bogs, marshes, wet meadows | No/Yes | Low; restricted to aquatic habitats |

## Pumice grape-fern

### *Ecology*

Pumice grape-fern is a diminutive plant (2 – 6 inches tall) that is endemic to central Oregon and found nowhere else in the world. It has a leathery, pale-green leaf on one stalk, with a second stalk that holds small bunches of 'grape-like' structures that contain spores. Pumice grape-fern is closely associated with the loose, volcanic soils of Central Oregon. It is found in pumice soil in two habitat types: on open, frost pockets within montane lodgepole (*Pinus contorta*), and on rocky summit slopes on alpine ridges (Powers 2008).

Pumice grape-fern is a perennial plant that does not appear above ground every year. The plants generally emerge above ground in mid-May; the spores mature and separate from the plant in late July. After the spores have been released, the plant dies back, and overwinters about two inches underground. For the spores to develop, they require complete darkness, as well as a mycorrhizal (i.e. fungal) partner (Johnson-Groh et al. 2002). This is essential for the plant to receive carbohydrates, minerals, and water critical to its survival. Without this mycorrhizal connection, the grape-fern plant would not live. Because of this fungal connection, the grape-fern is able to live underground for one to three years without sending up an above-ground, photosynthetic portion with no apparent loss of size or other negative effects (Johnson-Groh et al. 2002). It may take 5-8 years for a grape-fern's life cycle process to occur (i.e. for a spore to turn into an above-ground spore-bearing plant), according to research conducted on other *Botrychium* species (Johnson-Groh 1998).

The disturbance ecology of pumice grape-fern is not well understood. There has been only one documented study (Amsberry 2003) that has examined the effects of disturbance on this species. The results of this study found that plant burial is detrimental, while clipping and shading do not affect plant emergence. The study also found that recovery from mild scraping and compaction is possible. From observations made by botanists over the past decade, it appears that pumice grape-fern is not maintained by disturbance, but can recover from mild site disturbance, if the soil horizons are not displaced and the disturbance is not recurring (Powers 2008).

### *Existing Condition*

There are about 548 occurrences of pumice grape-fern in Central and South-Central Oregon, with the total number of plants estimated at a conservative 26,882 (Powers 2008). Pumice grape-fern is listed as Threatened by the Oregon Department of Agriculture, and is on the Oregon Natural Heritage Program's (2004) list 1: "taxa which are endangered or threatened throughout their range or which are presumed extinct".

On the Deschutes National Forest, there are 433 documented occurrences of pumice grape-fern, with approximately 16,360 individuals (Powers 2008). The majority of these sites are on the Bend Ft. Rock

District, with occurrences on Broken Top, Mt. Bachelor, Newberry Crater, and the Katai Basin. On the Crescent Ranger District, occurrences of pumice grape-fern are located under the Bonneville Power Administration (BPA) powerline near Highway 97, and in a lodgepole matrix near Highway 31 near the Katai Basin of the Bend Ft. Rock Ranger District (USFS 2001).

Within the Rim-Paunina project area, there are 14 known occurrences of this species. All these occurrences are centered under the BPA powerline. Botanical records from the late 1990's had documented a total of 97 individual plants at these sites (NRIS 2009). Focused surveys in 2008 of these same sites documented several hundred plants.

The abundance of pumice grape-fern under the BPA powerline is due to the amount of available habitat for this species. BPA keeps the powerline area clear of vegetation through manual tree and brush cutting, which maintains the open habitat that pumice grape-fern prefers. There is an existing road (Forest Service road 012) that runs underneath the powerline, and is used for OHV and 4x4 travel. Observations made during 2008 botany surveys did record evidence of vehicle disturbance (tread marks) at one of the pumice grape-fern sites. No other signs of human-caused disturbance were seen at the other grape-fern sites.

**Tomentypnum moss**

***Ecology and Existing Condition***

This moss species is found exclusively in moist, fen habitats of mid to high elevation coniferous forests (NatureServe Explorer 2010). *Tomentypnum nitens* is one of the more conspicuous of several species of so-called "brown mosses" that occur in mineral-rich fens. It is distinguished from other fen mosses by its golden-brown leaves and feathered appearance. *T. nitens* forms loose or dense sods or is intermixed with other bryophytes in medium to rich montane fens where it favors slightly elevated sites such as logs, stumps, or hummocks formed by bog blueberry (*Vacccinium uliginosum)* and bog birch (*Betula occidentalis*).

There is scant scientific literature concerning the ecology of *T. nitens*, especially in terms of potential threats. The growth of *T. nitens* is controlled by the balance between evaporation rate and transport of water from the water table to the canopy surface (Busby et al. 1978). Because this species is restricted to wetland habitats, the most obvious threat would be the loss of habitat or disruption of site hydrology. Other potential threats to the global population include livestock grazing, commercial peat harvesting, and conversion of peatlands to forest (Christy 2007).

*T. nitens* is a circumboreal species, being rare south of the Canadian border in Oregon and Washington, where it is at the southern edge of its range in the Pacific Northwest (Christy 2007). This species has been documented on the Deschutes, Fremont-Winema, and Umpqua National Forests, and at Crater Lake National Park. On the Deschutes National Forest, there are 22 documented sites of *T. nitens*, all of which are restricted to fen habitats (NRIS 2011). On the Crescent Ranger District, new occurrences of this species have recently been discovered in numerous fen habitats throughout the District, including Rim-Paunina unit 205.

**Matsutake Mushroom (**Plant Species of Concern)

The matsutake mushroom (*Trichloma magnivelare*) is an important commercial product on the Crescent Ranger District. Because of this commercial importance, effects to matsutake are considered for projects that occur within habitat for this species.

***Ecology***[33]
American matsutake is an edible and highly sought-after mushroom that grows throughout the Pacific Northwest. It ranges from southeast Alaska through the coastal pine forests and the eastern crest of the Cascade Range in Washington and Oregon, to the Siskiyou and Klamath mountains of southwest Oregon and northwest California (Pilz et al. 1996).

Matsutake is associated with a number of tree hosts, including lodgepole pine, ponderosa pine, Douglas-fir, mountain hemlock, and true firs. In the southern Oregon Cascades highly productive matsutake sites occur in mixed conifer and pine habitat between 4430 and 6560 feet elevation (Hosford et al. 1997). On the Crescent District, matsutake occurs primarily in the lodgepole, bitterbrush, and needlegrass plant association that is common in the southwestern region of the District.

There are numerous factors (both natural and anthropogenic[34]) that can affect the production and fruiting of matsutake. Such factors include weather, disturbance events, forest management practices, and mushroom harvesting (Pilz et al. 1999; Amaranthus et al. 2001; Luoma et al. 2006). Natural fire and prescribed fire both influence ectomycorrhizal community dynamics and succession in coniferous forests to varying degrees depending on intensity, time of fire, and length of time since fire (Dahlberg et al. 2001).

***Existing Condition***
The commercial harvest of American matsutake is a highly valuable industry in the Pacific Northwest with thousands of tons of mushrooms harvested annually (Molina 1993). Some of the most productive matsutake habitat is located on the Deschutes (Crescent Ranger District), Fremont-Winema (Chemult District), and the Umpqua (Diamond Lake District) Forests (Hosford et al. 1997). On the Crescent Ranger District an average of 287 commercial permits are purchased each harvesting season, at an annual value of $41,400 (this based on Crescent permit sales from 1989 to 2007). Data on the amount of matsutake mushrooms harvested from the Crescent District is not collected, so there is a lack of information of the cumulative volume (i.e. total weight) of mushrooms that are harvested annually.

Habitat for matsutake is primarily within the southwest region of the District. Within the Rim-Paunina planning area there is very little harvesting, due to the lack of available habitat. Instead, mushroom harvesters use the 94 road to access harvest areas within the neighboring Fremont-Winema Forests (T. Kerr, per. comm. 2010).

## *Environmental Consequences*

**Direct and Indirect Effects**
**Sensitive Species** (tomentypnum moss and pumice grape-fern)

**Alternative A – No Action**
Under this alternative, the existing management conditions would continue within the project planning area. There would be no effects to tomentypnym moss or pumice grape-fern as a result of the current management scenario.

[33] A detailed review of the matsutake ecology and disturbance effects can be found in Chapter 3 of the EIS document for the BLT project (USFS, Deschutes National Forest, Crescent Ranger District 2009).
[34] Relating to or resulting from the influence of human beings on nature. Merriam-Webster Dictionary Jan 2012

**Alternatives B-E**
None of the alternatives propose activities within the wet meadow habitat portion of unit 205 where a population of tomentypnum moss was documented. The proposed tree thinning adjacent this area would not have a detrimental effect on this population.

The project does include several treatment units that border known occurrences of pumice grape-fern along the BPA powerline (Table 97). To protect these occurrences from any ground disturbance associated with treatment activities, appropriate Project Design Features such as: "Known sites of pumice grape-fern would be flagged for avoidance prior to equipment work within the following treatment units: 655, 680, 755, 795, 796, 800, 805, 815, 820 and 870" and "No equipment or vehicles would be staged or parked within these flagged areas to protect pumice grape-fern plant" have been incorporated so that the project would have no effect on the pumice grape-fern.

**Table 97. Location of Pumice Grape-fern Sites near Rim-Paunina Project Units**

| Unit # | NRIS Site # | Location Comments |
|---|---|---|
| 655<br>680 | 06010200507 | between units |
| 755 | 06010200508<br>06010200509 | along eastern unit boundary<br>along eastern unit boundary |
| 795<br>796 | 06010200510<br>06010200511<br>06010200512 | between units |
| 800<br>805 | 06010200512<br>06010200513<br>06010200514 | between units |
| 815 | 06010200515 | along eastern unit boundary |
| 820 | 06010200098 | along northeast corner of unit |
| 870 | 06010200171 | between western edge of unit boundary and railroad track berm |

**Plant Species of Concern** (matsutake mushroom)
***Common to All Alternatives***
Because only marginal matsutake habitat is found within the planning area, there would be no quantifiable effect to matsutake production as a result of either a passive or active management scenario.

**Cumulative Effects**
Table 19 was reviewed for project actions that have a similar zone of influence and overlap in time and space with the Rim-Paunina vegetation management project. It was determined that there are no other past, present, or foreseeable actions that overlap the project area in space and time with potential to affect botanical resources. In addition, since there are no direct or indirect effects on botanical resources associated with activities in the Rim-Paunina project, there can be no cumulative effects associated with past, present, and foreseeable actions.

# Invasive Plants

## Introduction

Non-native invasive plants are those species that have been introduced into an environment in which they did not evolve and usually have no natural enemies to limit their reproduction and spread (Westbrooks 1998). The term 'noxious weed' refers to any plant classified by a State or national agriculture department as injurious to public health, agriculture, recreation, wildlife, or any public or private property (ODA 2010). For the purpose of this environmental report, the terms 'invasive plants' and 'noxious weeds' will be used interchangeably.

Invasive plants are aggressive species capable of degrading environmental quality or causing economic harm (USFS 2007). Such species have a number of physiological characteristics that permit them to rapidly invade into new areas and out-compete native vegetation (Westbrooks 1998). These traits include early maturation and rapid growth, profuse seed or vegetative reproduction, allelopathic toxins, and lack of natural enemies within invaded areas.

Invasive plants are especially undesirable in forest ecosystems because they tend to displace native plants, degrade habitat for wildlife species, contribute to soil erosion, and potentially reduce the value of recreational experiences (Westbrooks 1998; USFS 2007).

## Management Direction

### *National Direction*

The Noxious Weed Management Act (1974) contains provisions to prevent the dissemination of noxious weeds. Other provisions in the act authorize the cooperation of Federal agencies with agencies of State, districts, farmers' associations and similar organizations or individuals in carrying out operations or measures to eradicate, suppress, control, or retard the spread of any noxious weed. In addition, 36 CFR 222.8 acknowledges the Agencies' obligations to work cooperatively in identifying noxious weed problems and developing control programs in areas where National Forest System lands are located.

Executive Order 13112 implemented on February 3, 1999 requires Federal agencies to use relevant programs and authorities to prevent the introduction of invasive species and not authorize or carry out actions that are likely to cause the introduction or spread of invasive species unless the agency has determined, and made public, documentation that shows that the benefits of such actions clearly outweigh the potential harm, and all feasible and prudent measures to minimize risk of harm will need to be taken in conjunction with the actions. The USDA Forest Service *Guide to Noxious Weed Prevention Practices* (July 2001) supports implementation of Executive Order 13112 on Invasive Species.

### *Regional Direction*

Region 6 of the Forest Service has prepared an Invasive Plant Environmental Impact Statement (R6 IP EIS). The Final EIS was released in June 2005 and the Record of Decision (ROD) was signed in October 2005; implementation began March 1, 2006. The R6 Invasive Plant EIS applies to non-native invasive plant species. Standards and Guidelines in the R6 IP EIS are incorporated into Forest Plans in the region.

### *Forest Direction*

The Deschutes National Forest Land and Resource Management Plan is amended to incorporate Standards and Guidelines from the R6 IP EIS.

In 1998, the Deschutes National Forest Noxious Weed Control Environmental Assessment (DNF Weed EA) with its supplemental Deschutes National Forest Integrated Weed Management Plan (IWMP) was completed in accordance with the Regional Vegetation Management FEIS and Mediated Agreement. The

Decision Notice from the DNF Weed EA selected an alternative that allows a variety of noxious weed treatments, including herbicides (USDA Forest Service, Deschutes National Forest, 1998).

The DNF Weed EA and IWMP identify and promote actions within the noxious weed management strategies of prevention, early treatment, maintenance, and awareness. Implementation of management strategies include analyzing the risk of noxious weed invasion during the project planning process and developing tactics to avoid introduction or spread of noxious weeds, clean equipment provisions in contracts, actions to prevent weed introduction and spread, and suggestions for increasing awareness of noxious weeds and the risks they pose, both within the Forest Service and with the public.

Since the early 1990s, gathering information of location and size of infestations for all known noxious weed sites has been underway. This information has been entered into the Natural Resource Inventory System (NRIS) database for the Forest Service and GIS Invasives layer for the Deschutes Forest.

Under the authority of the DNF Weed EA, noxious weeds have been treated within the Crescent District starting in 1999 using manual control (e.g. hand-pulling).

**Existing Condition**

A pre-field review was conducted using the GIS Invasives layer (updated 1/28/2009) and the NRIS Invasives database (updated11/12/11) for the Deschutes National Forest. There are five occurrences (database records) documenting the presence of eight species of invasive plants that have been found within the Rim-Paunina project area. With the exception of one site, all of these occurrences were documented along Highways 58 and 97 (Table 98). Most of these sites are of historic weed infestations, which are weeds sites that were found and treated and now are monitored annually to ensure that the weeds have not re-emerged. There is only one infestation site within a treatment unit, which is an historic (found in 1997) site of bull thistle within Rim Paunina unit 775 (Figure 50). This site was re-surveyed on April 15 2010, and no bull thistle plants were found.

In unit 25 there is approximately one mile of a non-system road of indiscriminate age that would be obliterated as it is tied to the meadow enhancement/restoration activities in Five Mile Draw. There are no known invasive plants.

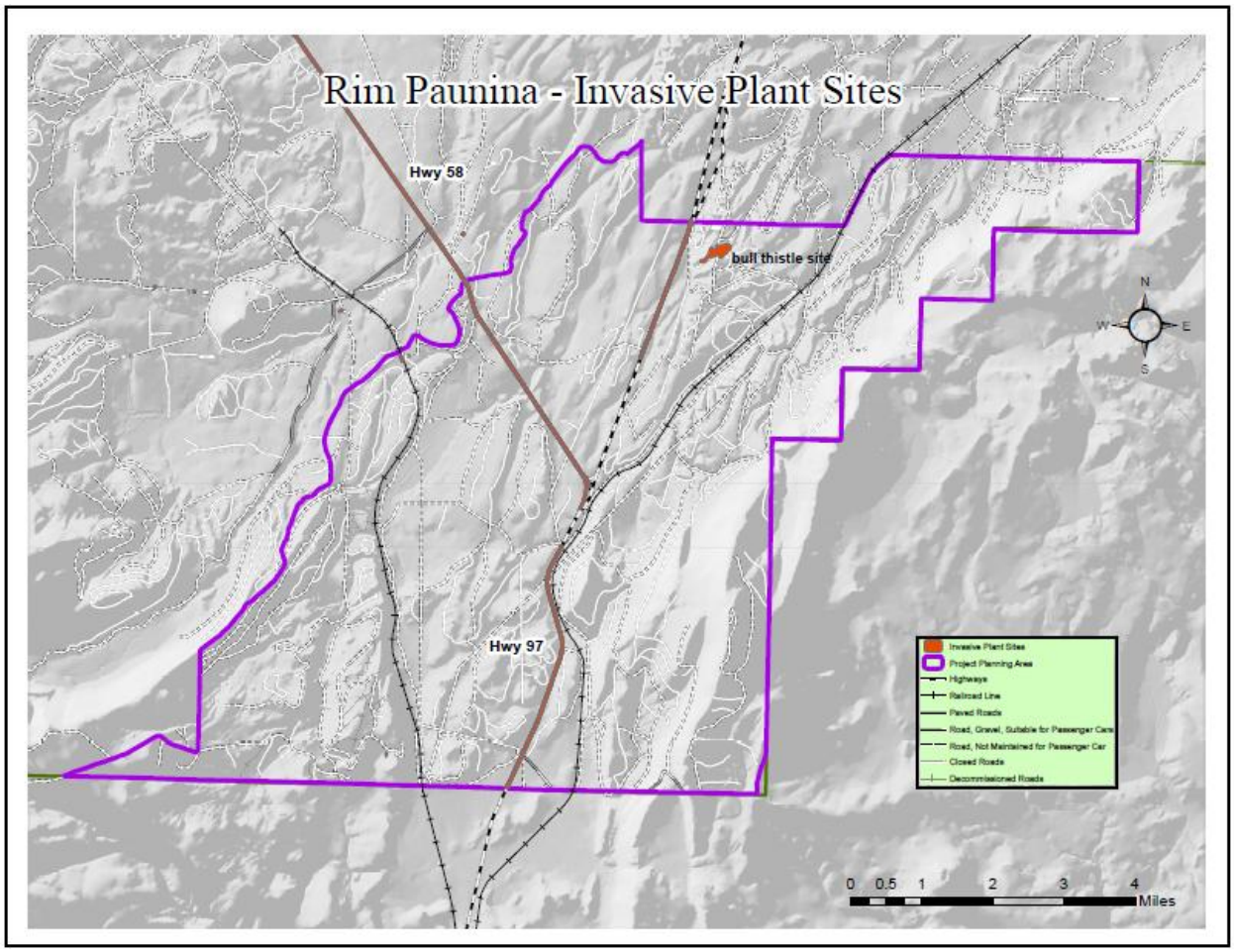



**Figure 50. Invasive Species Locations within the Rim-Paunina Treatment Areas**

The active (treated annually) weed sites consist of isolated infestations consisting of one to several dozen plants of the following weed species: spotted and diffuse knapweeds, Dalmatian toadflax, and St. John's wort. Below is a summary of the ecology and existing condition of these invasive plants:

- Spotted knapweed (*Centaurea biebersteinii*, formerly named *Centaurea maculosa*) is one of the most dominant weed species in the western United States. Throughout central Oregon, knapweed (both spotted and diffuse) are readily seen along roadways and in empty lots in midsummer to late fall, where it is identified by its purple flowers and bushy growth form. Spotted knapweed reproduces readily by seeds, which are dispersed by wind, vehicles, animals, or humans.

- Diffuse knapweed (*Centaurea diffusa*) like spotted knapweed, is a biennial or short-lived perennial plant that blooms mid-summer to fall. It is also recognized from its bushy growth form (up to 3 feet tall) and pale pink to purple flowers. Like other knapweeds, diffuse knapweed is a highly competitive and aggressive plant that forms dense colonies. It is especially adept at spreading along right-of-ways and can spread rapidly. Disturbed lands are prime candidates for colonization, but diffuse knapweed will also invade undisturbed grasslands, shrublands, and riparian communities.

Both spotted and diffuse knapweeds are the most problematic weeds in upland settings on the Deschutes National Forest. On the Crescent Ranger District, small infestations of spotted knapweed are found every year and hand-pulled along Highways 58 and 97.

- Dalmatian toadflax (*Linaria dalmatica*) is a perennial herb that is easily recognized by its showy yellow flowers, which resemble snapdragon plants. This species is a persistent, aggressive invader capable of forming colonies through creeping root systems. Toadflax primarily occurs on roadsides, railroads, pastures cultivated fields, range lands, and within clearcuts. Because of its spreading root system, toadflax is capable of invading relatively undisturbed and open native plant communities. Within the Crescent Ranger District, small infestations of common and Dalmatian toadflax have been documented and hand-pulled along Highways 58 and 97.

- St. John's wort (*Hypericum perforatum*) is also known as goatweed or Klamath weed. It is a perennial plant, 1-3 feet tall, and is distinguished by its abundant yellow flowers and gland-dotted leaves. This species is listed as an invasive plant in over 20 countries, and is a common weed throughout the Pacific Northwest. Infestations of St. John's wort spread rapidly on disturbed, well drained sites such as roadways, trails, ski slopes, overgrazed rangeland, and logged areas.

- Bull thistle (*Cirsium vulgare*) is a common weed of the Pacific Northwest that reproduces solely from seeds that are dispersed by wind, water, animals, and human activities (ODA 2010). Disturbed areas are prime habitat for bull thistle to invade. On the Crescent Ranger District, bull thistle commonly invades logging landings, skid trails, and burned areas. Anecdotal observations of bull thistle seem to indicate that this species inhabits a disturbed site temporarily, then decreases and disappears when native vegetation regains its pre-disturbance levels. In areas that are continually disturbed, such as roadsides, bull thistle may invade and persist if not controlled. Due to a combination of limited funds and noxious weed species of higher priority, bull thistle is only treated in limited areas (logging landings, etc.) on the Deschutes National Forest.

- Common mullein (*Verbascum thapsus*) is a biennial or short-lived perennial from Europe that can reach heights of five feet or more. It is easily recognized by its large, woolly leaves and tall spike of yellow flowers. Mullein readily invades disturbed areas with bare ground such as roadsides, burned areas, logging sites, and pastures (Invasipedia 2010). Mullein is an ephemeral species that is eventually displaced by other vegetation, and is easily outcompeted by intact vegetation communities. It is a common weed on the Deschutes National Forest, and is only treated in specific project areas. On the Crescent District, mullein is commonly found along roadways, in tree thinning units, logging landings, and burned areas.

- Canada thistle (*Cirsium arvense*) is a perennial, rhizomatous thistle that is distinguished by its small, purple flowerheads. Contrary to its name, this species is native to Europe and was introduced into North America in the early 17$^{th}$ century. Canada thistle is primarily a weed of wet areas such as meadows, canal edges, and riparian areas. In the past, small occurrences of this species have been removed along Hwy 97 within the Rim Paunina planning area.

- Yellow star thistle (*Centaurea solstitialis*) is a highly aggressive, adaptable weed that inhibits the growth of native and agriculture plants in forest, pasture, rangeland, and wasteland areas. There has been one occurrence of this weed that was found and removed along Hwy 97.

- Kochia (*Kochia scoparia)* is a highly weedy annual, native to Eurasia that is found widely in disturbed environments such as pastures, roadsides, abandoned lots, and agriculture fields. It easily reproduces by seed from dispersal by wind and water, especially when the entire plant

detaches into a 'tumbleweed' and is rolled by the wind. Isolated infestations of this species have been found and treated along Highway 97 within the Rim-Paunina planning area.

Although all of the above-mentioned species are listed on the weed list for the Deschutes Forest, not all have the same treatment priority. For example, mullein and bull thistle are common weeds found in recently disturbed areas (i.e., logging landings, road edges, etc.) on the Forest. Because these are ephemeral weeds that eventually get replaced by native vegetation, mullein and bull thistle are a low priority for treatment. Other species, such as the knapweeds and toadflaxes, are a high treatment priority because of their ability to rapidly spread into forest plant communities.

As part of the District's Invasive Plant Program, Highways 58 and 97 are routinely monitored during each summer field season, with all weed infestations either manually removed via hand-pulling or though herbicide application along the Oregon Department of Transportation (ODOT) easement on the highway margins. Through this program, all the major highways and roads, as well as recreational sites, have been monitored and treated annually for weeds since 1999. Although all plants are removed each year, weed material is dispersed from passing vehicles, which causes new infestations that need to be treated.

**Table 98. Known Occurrences of Invasive Plant Species within the Rim-Paunina Planning Area**

| NRIS Site Number | Species | Location or Unit # | Historic or Active Site* |
|---|---|---|---|
| 6120042 | Bull thistle | Unit 755 | H |
| 6120101 | Canada thistle | Hwy 58 | H |
| 6120052 | Canada thistle | Hwy 58 | H |
| 6120100 | Yellow starthistle, kochia, | Hwy 97 | H |
| 6120100 | Spotted and diffuse knapweeds, Dalmatian toadflax, St.John's wort | Hwy 97, Hwy 58 | A |

*Historic site – infestation no longer present, site monitored annually; Active site – treated annually to contain or eliminated infestation

## Risk Assessment and Environmental Consequences

### Risk Ranking

The following factors are used to determine the level of noxious weed risk (low, moderate, and high) associated with the Rim-Paunina project:

- Presence of known weed populations and whether or not those populations can be avoided
- Level of disturbance
- Resource value
- Introduction vectors

### Risk Assessment Effects

The risk of the introduction and spread of invasive plants for the Rim-Paunina project is low for Alternative A (No Action), and high for all other proposed Alternatives. This risk assessment is based upon the listed risk factors, as ranked for each alternative (
Table 99). Common to all action alternatives are Factors 1, 3, and 4. Factor 2 is the level of disturbance associated with each alternative, and is the factor that varies among the alternatives. Higher treatment acres and greater disturbance associated with a particular alternative would lead to a higher risk factor for invasive plants. Such disturbance would include the miles of temporary road construction, road maintenance, and commercial hauling routes (Table 100).

Because of the assessed high risk of the all the proposed alternatives, any ground-disturbing activities would have the required Project Design Features to lessen the risk from invasive plants.

**Table 99. Risk Assessment for the Proposed Rim-Paunina Alternatives**

| | Factors | | | | |
|---|---|---|---|---|---|
| **Alternatives** | **Existing Infestations** | **Disturbance Level** | **Resource Value** | **Introduction Vectors** | **Total** |
| **A** | Low | Low | High | Low | **Low** |
| **B** | Low | High | High | High | **High** |
| **C** | Low | High | High | High | **High** |
| **D** | Low | High | High | High | **High** |
| **E** | Low | High | High | High | **High** |

**Table 100. Ground Disturbance Associated with each Alternative**

| Action | Alt. A | Alt. B | Alts. C & D | Alt. E |
|---|---|---|---|---|
| Commercial thinning (acres) | 0 | 12,036 | 9,792 | 11,236 |
| Prescribed fire (acres) | 0 | 8,506 | 12,762 | 13,490 |
| Temp road construction (miles) | 0 | 9.2 | 6.5 | 8.3 |
| **Disturbance level** | **Low** | **High** | **High** | **High** |

### Cumulative Effects

There are two foreseeable actions that have the potential to intensify direct and indirect effects. The first is the implementation of the Three Trails OHV project, which plans to create a designated OHV route and staging areas overlapping the planning area. Although the risk rating is categorized as "High" for the action alternatives in Rim-Paunina, the Three Trails OHV project would add another potential vector for weed introduction and spread. This risk is partially offset by limiting motor vehicles to designated routes, where it would be feasible to monitor and treat weed infestations. Given the associated risk of overlapping projects, other similar situations on the Ranger District have demonstrated a successful prevention program in limiting spread or introduction of new invasive populations (i.e. post-Davis Fire monitoring).

The other foreseeable action is the finalizing of the Environmental Impact Statement for Invasive Plants for the Deschutes and Ochoco Forests. This document tiers to the Region 6 Invasive Plant Final Environmental Impact Statement, and would control invasive plants on approximately 15,000 acres across both Forests. Currently the Invasive Plant EIS is in draft form and is being revised by Deschutes and Ochoco Forest staff. Although there are no identified invasive plant populations to be treated within the Rim-Paunina area, the rapid response element of the preferred alternative would augment the current ability to control and eradicate new weed infestations.

### Project Design Features

Project Design Features (PDFs) are specific activities that are incorporated into each alternative for the purpose of protecting natural resources within the project area. These design features are considered routine and effective, have been used in similar projects, and are incorporated into contract provisions or accomplished by the appropriate resource specialists.

For invasive plants, the focus is on PDFs that prevent the introduction and spread of such species. These PDFs are taken from the national *Guide to Noxious Weed Prevention Practices* (USFS 2001), the Region

6 Invasive Plant EIS, and the Deschutes and Ochoco national Forests Invasive Plant Prevention Guidelines.

The following Project Design Features are required for the Rim-Paunina project:

1. Remove mud, dirt, and plant parts from all heavy equipment that will operate outside the limits of the road prism prior to entering NFS lands AND before moving into a new or different analysis area. Cleaning must occur in areas where removed weed seeds will not create additional problems. *Requirement R6 Standard #2.*
2. Require all Forest Service employees to inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and personal equipment prior to leaving a project site infested with weeds. *Guideline*
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 are judged to be weed free by District or Forest weed specialists. *Requirement R6 Standard #7*

## Fisheries and Aquatic Resources

The following section summarizes the specialist report in its entirety. This Biological Evaluation (BE) documents the review and findings of the 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 Threatened or Endangered; or (2) designated by the Pacific Northwest Regional Forester as Sensitive; or (3) required consultation with the National Marine Fisheries Service (NMFS) under the Magnuson-Stevens Fishery Conservation Act (MSA). It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, and the Endangered Species Act of 1973, as amended (ESA) (Subpart B; 402.12, Section 7 Consultation).

The following analysis addresses the potential effects of implementing the Rim-Paunina vegetation management project on threatened, endangered, and sensitive fish species as well as other aquatic resources. This determination, required by the Interagency Cooperation Regulations (Federal Register, January 4, 1978), ensures compliance with the ESA. Changes to the R-6 Regional Forester's Sensitive Species List were instituted on November 28, 2000.

There are no, threatened, proposed, candidate or sensitive aquatic species or their habitat within the Rim-Paunina planning area. This is attributed to the lack of perennial or fish bearing water bodies. Also, there are no State of Oregon 303(d) listed impaired water bodies within the planning area. The water quality analysis area for the Rim-Paunina project is limited to intermittent and ephemeral draws (such as Five Mile Draw and Boundary Springs).

The Magnuson-Stevens Fishery Conservation Act (MSA) does not apply as there are no perennial or fish bearing streams, no anadromous fish or their habitat in the project area.

The following table displays the threatened, endangered and sensitive (TES) species considered in the analysis of the Rim-Paunina Vegetative Management Project.

**Table 101. Threatened, Endangered, and Sensitive Fish Species**

| Aquatic Species | Scientific Name | Status | Occurrence | Effects Determination |
|---|---|---|---|---|
| Columbia River Bull Trout | *Salvelinus confluentus* | Threatened | No Habitat | **No Effect** |
| Interior Redband Trout | *Oncorhynchus mykiss* ssp. | Regional Forester Sensitive | No Habitat | **No Impact** |

### Methodology

To estimate hydrological conditions within the project area, the following resources were utilized: Geographical Information System (GIS), aerial photos, field reconnaissance, and best available research. GIS analysis was conducted utilizing National Hydrography Dataset (NHD) Waterbody and United States Geological Society (USGS) Hydrological Boundaries (HUC) layers.

### Assumptions

- The coarse textures of the ash/pumice have high water infiltration and percolation rates that readily drain excess moisture.
- Underlying residual soils and bedrock have a moderate capacity to store water, therefore most of the water from these lands is delivered to streams as deep seepage and subsurface flows.

- Deep, highly drained pumice soils of the area are not prone to convey overland flow which could deliver sediment from upslope sources.
- Overland flow does not generally occur from a reduction in evapo-transpiration when trees are harvested because infiltration rates often exceed precipitation rates.
- The nearest perennial water body is the Little Deschutes River which lies over 2,000 feet away to the west from the project boundary.
- There would be relatively few (if any) quantifiable effects associated with riparian resources due to prohibition of tracked or rubber-tired machinery on wetted surfaces.

**Introduction**

The Rim Paunina project proposes vegetative management, including commercial timber harvest and fuels reduction, across an approximately 40,000 acre project area. The proposal addresses forest health and hazardous fuels concerns on National Forest System land of the Deschutes National Forest. The Zone of Influence is at the 5$^{th}$ and 6$^{th}$ field watershed scale. The project area lies almost entirely (99 percent) within the Little Walker Mountain Watershed (Table 102 and Figure 51), and thus the area for this fisheries and aquatics analysis has been confined to this watershed. There are no perennial streams or water bodies within the planning area.

All proposed units lie under the direction of INFISH and East Side Screens as the project area is primarily located south of Hwy 58, on each side of Hwy 97 (T: 25-26 S., R: 6 ½ E, T: 25-26 S, R: 7 E, T: 24 S, R: 8E.).

The Clean Water Act requires the State of Oregon to develop water quality standards that protect the beneficial uses of the water. The act also requires the state to establish a list of water bodies that do not meet such standards. Beneficial uses and the associated water quality standards are generally applicable drainage wide. At a minimum, uses are considered attainable wherever feasible or wherever attained historically. There are no State of Oregon 303(d) listed water bodies within the planning area.

The United States Geological Society (USGS) has recently redrawn and renamed watershed and subwatershed boundaries for the state of Oregon. Within this project planning area to maintain consistency when comparing actions associated with this project and past analysis projects, such as the recent Three Trails OHV project, the old subwatershed names and boundaries have been used throughout this analysis.

**Table 102. Acres by Subwatershed (SWS) in the Rim-Paunina Analysis Area**

| Watershed (5$^{th}$ field) | Subwatershed (6$^{th}$ field) | SWS Acres | Acres in Project Area Boundary | NFS acres In Project Area Boundary |
|---|---|---|---|---|
| Little Walker Mountain | Corral Springs | 12,792 | 2,637 | 2,637 |
| | Crescent Butte | 13,151 | 4,534 | 4,534 |
| | Little Walker Mountain | 14,044 | 12,628 | 12,598 |
| | North Paunina | 12,945 | 10,282 | 10,214 |
| | North Walker | 22,661 | 1,061 | 1,061 |
| | South Paunina | 10,865 | 8,495 | 8,488 |
| Sellers Creek | Upper Sellers Creek | 9,950 | 19 | 19 |
| Klamath Marsh/ Jack Creek | Jack Creek | 59,948 | 271 | 271 |
| **Total** | | 96,460 | 39,928 | 39,823 |

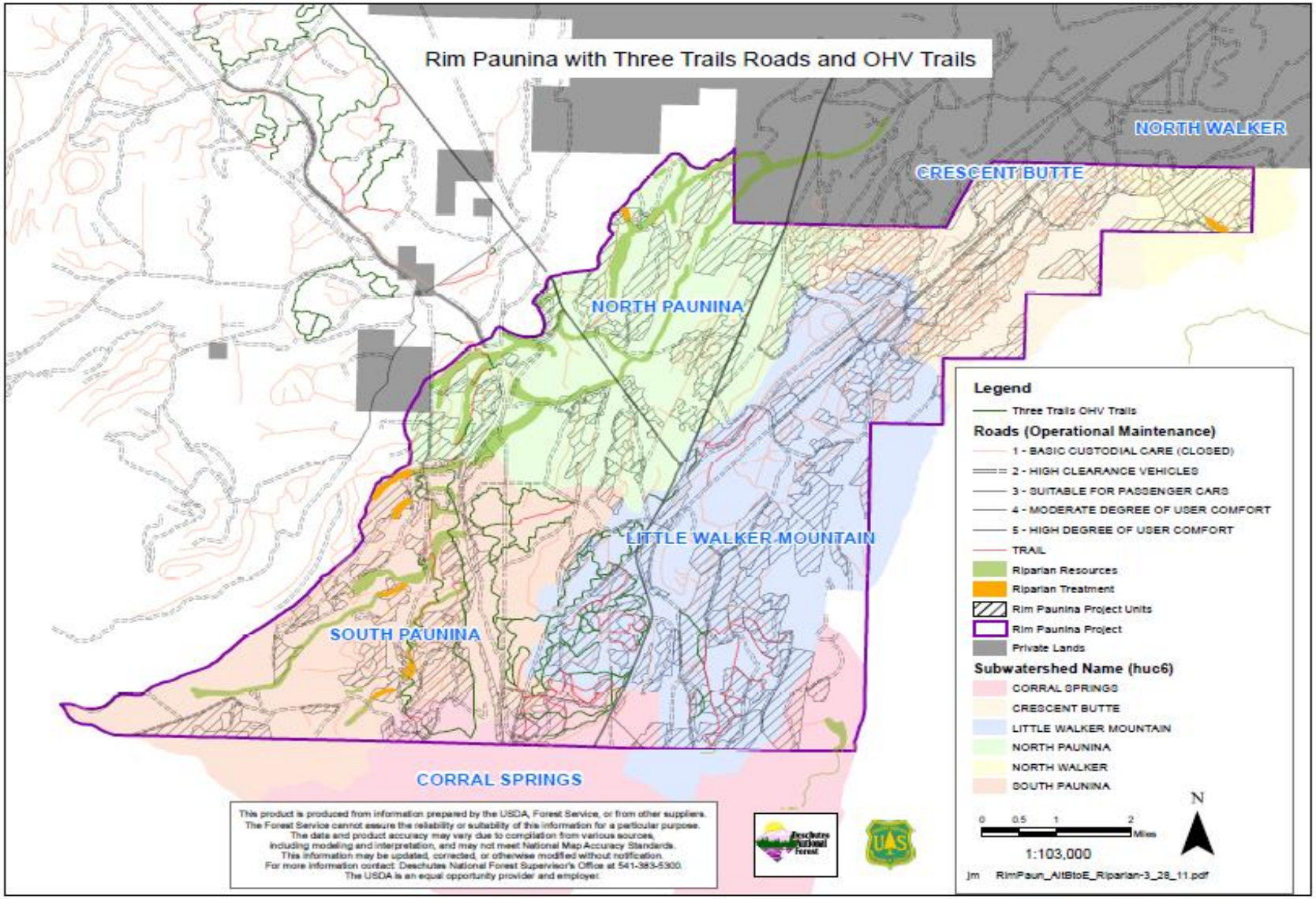



**Figure 51. Rim-Paunina Area with 6th Field Subwatersheds, RHCAs with Treatment (orange), and Roads and Trails from Three Trails OHV Project**

**Management Direction**
All federal land management activities in the Rim-Paunina project area must follow standards and guidelines (S&Gs) listed in the 1990 Deschutes National Forest Land and Resource Management Plan (LRMP), as amended by the Northwest Forest Plan (NWFP) (USDA Forest Service and USDI Bureau of Land Management 1994) and INFISH (USDA 1995), and in accordance with Best Management Practices (WT-5; USDA Forest Service 1998a) and the Clean Water Act (WT-1). All National Forest lands in the Rim-Paunina project area fall under the guidance of the INFISH.

Direction for managing water quality, water quantity, and riparian areas on the Deschutes National Forest are found in the Forest Service Manual, Title 2500 - Watershed and Air Management (FSM), Forest Service Inland Native Fish Strategy Environmental Assessment (INFISH), General Water Quality Best Management Practices (BMP), the Clean Water Act (CWA), Executive Orders 11988, 11990 and 12088, and the Deschutes National Forest Land Resource and Management Plan (LRMP).

***1990 Deschutes Land and Resource Management Plan (LRMP) as amended***
**Riparian Areas/Wetlands, Streamside Management Units, and Flood Plains**
Riparian areas are managed to protect fish habitat, water quality, and conditions required by wildlife species which depend upon or utilize them. Riparian areas occur along the interface between aquatic and terrestrial ecosystems. These water oriented ecosystems are surrounded by drier upslope ecosystems. They make up a minor portion of the landscape but are extremely important in regard to land management and land use. Five Mile draw is an old streambed under Mazama ash and is now an ephemeral stream in the planning area.

A detailed description of riparian area standards and guidelines are provided in the Forest Plan (USDA LRMP 1990 p. 4-61-4-66). The relevant direction:

**RP-1** *Riparian areas will be managed in context of the environment in which they are located. Specifically, Forest policy shall be based on the following guidelines:*

**RP-2** *Maintain or enhance riparian areas and the riparian dependent resources (water quality and quantity, fish and certain wildlife and vegetation that owe their existence to riparian areas) associated with these areas.*

**RP-4** *Manage riparian areas under the principles of multiple use and sustained yield, while emphasizing protection of riparian dependent resources. Outputs of non-riparian dependent resources (timber harvest, grazing, recreation, special uses) can be pursued as long as they do not conflict with the objectives and needs of riparian dependent resources*

**RP-5** *Identify and pursue opportunities in riparian areas for enhancement of fisheries and wildlife habitat.*

**INFISH**
The Deschutes National Forest Land and Resource Management Plan (LRMP) was amended in 1995 by the Decision Notice and Finding of No Significant Impact for the Inland Native Fish Strategy (INFISH). The interim direction is in the form of riparian management objectives, standards and guidelines, and monitoring requirements. Riparian Management Objectives (RMOs) describe good habitat for inland native fish and anadromous fish and interim guidance would apply where Watershed Analysis has not been completed. INFISH provides standards and guidelines for RHCAs that prohibit or regulate activities

that retard the attainment of Riparian Management Objectives at a watershed scale. The primary focus of monitoring is to verify that the standards and guidelines were applied during the project implementation.

Priority watersheds were identified to help prioritize restoration, monitoring, and watershed analysis for areas managed by INFISH. All portions of subwatersheds in the Rim-Paunina project boundary are "non-priority watersheds." There are no Tier One or Key watersheds in or overlapping the planning area. Another essential piece of INFISH is the delineation of Riparian Habitat Conservation Areas (RHCAs) which "include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of the aquatic ecosystems by (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream, and (4) protecting water quality" (USDA 1995). Riparian Reserve widths under the Northwest Forest Plan area based on average maximum tree height (150 feet), 100 year floodplain, extent of riparian vegetation, and unstable and potentially unstable lands. These same adjustments to Riparian Reserves in the Northwest Forest Plan (NWFP) area should also be applied to RHCA for subwatersheds in the Rim-Paunina analysis area that follow under the guidance of INFISH.

**Table 103. Relevant Riparian Habitat Conservation Area (RHCA) Widths that Apply in the Rim-Paunina Analysis Area**

| Category | Stream Class | Description | Riparian Reserve width (slope distance (feet) from edge of channel) |
|---|---|---|---|
| **3** | NA | Ponds, lakes, reservoirs, and wetlands > 1 ac | 150 feet |
| **4** | 4 | Seasonally flowing or intermittent streams, wetlands < 1 ac, landslides, and landslide-prone areas | Non-priority = 70 feet |

**Table 104. The Four Categories* of Stream or Water Bodies and Standard Widths for each**

| Category | Standard Widths |
|---|---|
| Category 3 – Ponds, lakes, reservoirs, and wetlands greater than 1 acre- | Interim RHCAs consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest. |
| Category 4 – Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide-prone areas | This category includes features with high variability in size and site-specific characteristics. At a minimum the interim RHCAs must include:<br>a. The extent of landslides and landslide-prone areas<br>b. The intermittent stream channel and the area to the top of the inner gorge<br>c. The intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation<br>d. For Priority Watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one-site potential tree, or 100 feet slope distance, whichever is greatest<br>e. For watersheds not identified as Priority Watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greatest |
| *In non-forested rangeland ecosystems, the interim RHCA width for permanently flowing streams in Categories 1 and 2 is the extent of the 100-year floodplain. | |

***INFISH Riparian Goals***

The goals establish an expectation of the characteristics of healthy, functioning watersheds, riparian areas, and associated fish habitats. INFISH identifies several goals for watershed, riparian, and stream channel conditions. The goals[35] are to maintain or restore:

- **Diversity and productivity of native and desired non-native plant communities in riparian zones;**
- **Riparian vegetation, to:**
  - **Provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems;**
  - **Provide adequate summer and winter thermal regulation within the riparian and aquatic zones; and**
  - Help achieve rates of surface erosion, bank erosion, and channel migration characteristic of those under which the communities developed.
- **Habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian-dependent communities (INFISH; pg. A-1 to A-2).**
- **Natural timing and variability of the water table elevation in meadows and wetlands**
- Water quality, to a degree that provides for stable and productive riparian and aquatic ecosystems;
- Stream channel integrity, channel processes, and the sediment regime...under which the riparian and aquatic ecosystems developed;
- Instream flows to support healthy riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges; and
- Riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic region.

***INFISH Standards and Guidelines***

Project and site-specific standards and guidelines listed below would apply to all Riparian Habitat Conservation Areas (RHCAs) and to projects and activities in areas outside RHCAs that are identified through NEPA analysis as potentially degrading RHCAs. The combination of the standards and guidelines for RHCAs specified below with the standards and guidelines of existing forest plans and Land Use Plans would provide a benchmark for management actions that reflects increased sensitivities and a commitment to ecosystem management (INFISH; pg. A-6).

Timber Management, *TM-1 "Prohibit timber harvest, including fuelwood cutting, in Riparian Habitat Conservation Areas, except where noted below:*

*a) Apply silviculture practices for Riparian Habitat Conservation Areas to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives. Apply silviculture practices in a manner that does not retard attainment of Riparian Management Objectives and that avoids adverse effects on inland native fish.*

TM-1 allows for the vegetative manipulation in the Riparian Habitat Conservation Areas when treatments are designed to improve riparian conditions by restoring natural diversity and native riparian dependent vegetation as described under the INFISH riparian goals above.

[35] The four goals highlighted are the most relevant to the Five-Mile draw area in the Rim-Paunina project.

Also, INFISH Standards and Guidelines for achieving Riparian Management Objectives for Roads Management (RF-1 through RF-5), Fire and Fuels Management (FM-1 through FM-5), General Riparian Area Management (RA-1 through RA-50), and Watershed And Habitat Restoration (WR-1 through WR-2) apply.

**Riparian Management Objectives (RMOs)**
RMOs provide the criteria against which attainment or progress toward attainment of the riparian goals is measured. RMOs would not apply to the Little Walker Mountain watershed as it does not contain native fish as stated in INFISH (pA-3) 'Under this strategy, interim RMO's would apply to watersheds occupied by inland native fish."

**Riparian Habitat Conservation Areas (RHCAs)**
RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines (Table 102). RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream, and (4) protecting water quality (INFISH; pg. A-4 to A-6).

***Best Management Practices for Water***
Best Management Practices are the primary mechanism to enable the achievement of water quality standards. Inherent in prescribing project-level management requirements is recognition of specific water quality objectives which BMPs are designed to achieve. A detailed description of water-BMP standards and guidelines (WT-1 through WT-7) are provided in the Forest Plan (LRMP; pg. 4-69 to 4-70). However, WT-1 states: "State requirements will be followed in accordance with the Clean Water Act for protection of waters of the State of Oregon (Oregon Administrative Rules, Chapter 3 40-41) through planning, application, and monitoring of Best Management Practices (BMPs) in conformance with the Clean Water Act, regulations, and federal guidance issued thereto" (USDA 1990). Appendix B of this document has a list of BMPs used.

**Hydrologic Processes**
**Precipitation**
Precipitation in the project area ranges from 50 inches a year in the southwest corner to 24 inches per year in the northeast (1971-2000 annual average precipitation). Elevations in the project area range from 4,500 feet to 7,080 feet, therefore, most precipitation falls as snow as the area is above the rain-on-snow zone (approx. 3,500-5,000 feet). Within the project area, approximately two-thirds of the precipitation occurs between October and March. A secondary peak of precipitation occurs between May and August and falls as high, intensity thunder showers. Although portions of these subwatersheds experience a significant amount of precipitation and some high intensity storms, there is very little surface channel flow, as is evidenced by the low drainage density.

**Overland Flow**
The low drainage density in these subwatersheds is due to the soils and underlying geology. Soils in the analysis area are primarily volcanic ash with rapid infiltration rates. These course materials allow water to move quickly through the soil and rock profile and down into the groundwater. As water moves through the soil profile in these areas, it may become perched and move laterally across the outwash and till and emerge as springs. As a result of rapid infiltration and high permeability rates, overland flow is rare in the analysis area.

Within the analysis area, overland flow does not generally occur from a reduction in evapotranspiration when trees are harvested because infiltration and permeability rates often exceed precipitation rates.

However, overland flow can occur in areas where infiltration rates are reduced, such as rain-on-snow zones and road surfaces. The greatest influence on overland flow in the analysis area is roads (USDA Forest Service 1998).

**Roads and Trails**

The Rim-Paunina area utilizes the least amount of road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest Lands. Figure 51 shows the overlay of roads and trails and the proximity to the RHCAs. For a more detailed discussion of the entire road system, reference the Transportation section in this chapter.

Portions of the Rim-Paunina project and the Three Trails Off-Highway Vehicle (OHV) project overlap. All crossings of wet features utilize existing Forest Service roads designed with Best Management Practices except in the Three Trails OHV Project (10-mile Loop Trail) where the trail follows an existing user-created trail which crosses four ephemeral draws that are truncated at a railroad grade downstream. There is no surface connection to perennial streams or fish bearing water. Also, there are no overlapping activity units from Rim-Paunina. If avoidance of these four riparian segments is not possible, an elevated tread would be constructed to reduce the impacts on the riparian feature and the underlying tread in the swale would be decompacted to facilitate water percolation and reduce puddling. They also would be designed as to not interfere with surface or subsurface flow of water. These crossings would have no quantifiable effect to water quality or resident fish or their habitat because these draws are ephemeral and terminate within 1,000 feet at a railroad prism, the drainages do not have surface connection to any body of water, and the Project Design Features in the Three Trails OHV Project are proven to be effective.

According to the document, “Determining Risk of Cumulative Watershed Effects Resulting from Multiple Activities” (USDA Forest Service 1993), road densities in the Little Walker Mountain and South Paunina subwatersheds are considered high (Table 105). Although road density is high, only roads adjacent to streams, crossing streams, or hydrologically connected to streams via road ditches have an influence on streamflow or water quality (USDA Forest Service 1998). In these two subwatersheds, the relatively higher densities are attributed to access to private lands, County and State roads (Highways 58 and 97) as well as access for recreation, suppression, and other resource management.

**Table 105. Road Densities Including OHV Trails in the Rim-Paunina Water Quality Analysis/Project Area**

| 6th Field Watershed | 6th Acres | Density Total Roads Mi/Mi² | Density Total Open Roads Mi/Mi² | Density FS Open Roads Mi/Mi² | OHV Trails Miles | Total FS "Open" Motorized (Total non-level 1 + OHV Trails) Miles | Density Total FS "Open" Motorized (non-level 1+ OHV Trails) Mi/Mi² |
|---|---|---|---|---|---|---|---|
| Corral Springs | 12,791.6 | 5.90 | 5.61 | 0.42 | 7.53 | 15.84 | 0.79 |
| Crescent Butte | 13,150.8 | 6.30 | 4.34 | 1.03 | 0.00 | 21.19 | 1.03 |
| Little Walker Mountain | 14,044.0 | 5.29 | 2.95 | 2.07 | 33.21 | 78.62 | 3.58 |
| North Paunina | 12,944.5 | 5.37 | 3.86 | 1.75 | 2.49 | 37.89 | 1.87 |
| North Walker | 22,661.1 | 3.86 | 3.72 | 0.04 | 0.00 | 1.37 | 0.04 |
| South Paunina | 10,865.1 | 5.04 | 3.55 | 2.28 | 23.35 | 62.08 | 3.66 |

### Streamflow

Perennial streams in the Rim-Paunina water quality analysis area are non-existent. There are intermittent[36] and ephemeral[37] streams, particularly in the Five Mile Draw area. Rather than a defined stream channel, stream corridors are typically just a valley bottom supporting riparian dependent vegetation. Stream channels, where they exist on the landscape, are generally poorly defined and development is minimal. Typically water is present on the surface during spring snowmelt season, where it ponds up and creates wet meadow features. Water movement is very low velocity and therefore erosion is not common as the water lacks stream power necessary to mobilize and transport suspended sediments or bedload.

Wet meadow systems are extremely important features on the landscape. They contain a diversity of plant species and provide forage and habitat for terrestrial species. Compaction or diversion of flows in these areas can negatively affect water storage by impeding water infiltration through the soil. Therefore a Project Design Feature, common to all action alternatives, would exclude tracked or wheeled equipment from entering meadows or operating on fragile soils. There are no named water features in the planning area (Table 106).

**Table 106. Streams and their Flow Regime in the Rim-Paunina Analysis Area**

| Subwatersheds | Perennial stream miles in SWS | Intermittent stream miles in SWS | Ephemeral stream miles in SWS | Total stream miles | Within Planning Area |
|---|---|---|---|---|---|
| Corral Springs | 0 | 2.1 | 4.4 | 6.5 | 1.5 |
| Crescent Butte | 0 | 0 | 0 | 0 | 0 |
| Little Walker Mountain | 0 | 0.4 | 32.4 | 32.8 | 30.2 |
| North Paunina | 0 | 12.9 | 18.9 | 31.8 | 25 |
| North Walker | 0 | 0 | 6.3 | 6.3 | 0.7 |
| South Paunina | 0 | 5.1 | 19.2 | 24.3 | 19.6 |
| **Total** in Analysis Area | 0 | 20.5 | 81.2 | 101.7 | **76.9** |

### Temperature

There is no water temperature data available within the planning area as there are no perennial water bodies or fish present.

### Hydrologic Cycle

The hydrologic cycle represents the processes and pathways by which water is circulated from land and water bodies to the atmosphere and back again. The hydrologic functioning of a watershed depends on its ability to receive, store, and transmit water and is strongly correlated with vegetation and soil disturbances (Neary et al. 2005).

[36] Intermittent streams: ‘streams that carry water a considerable portion of the time, but which cease to flow occasionally or seasonally when bed seepage and evapotranspiration exceeds the available water supply.” Free Dictionary 2011.

[37] Ephemeral streams: streams that only flow during and immediately after precipitation. Wikipedia 2011

Central Oregon is unique as it has a thick layer of Mount Mazama volcanic ash soil (20 to 40 inches thick in the planning area). Infiltration rates are high in the porous, ash soils and there is no documented evidence of changes in peak and/or base flows within the project area. Also, water is typically expressed on the surface during the spring snowmelt after which water, where present, is found in isolated small pools or ponds.

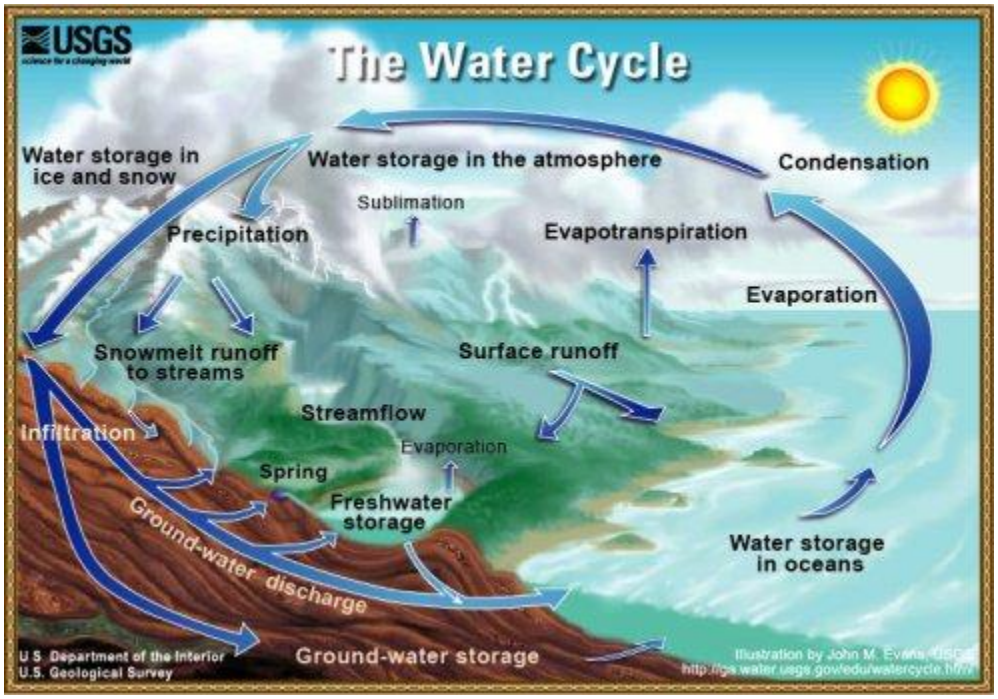



**Figure 52. The Hydrological Cycle (USDI GS 2009)**

Fire affects water quality characteristics through the changes that the burning causes in the hydrologic cycle and stream flow regimes. The effects to water quality and quantity are largely dependent on the size, intensity, and severity of the fire, the condition of the watershed when rainfall starts, and the intensity, duration, and total amount of rainfall. When fire destroys vegetation and organic matter on the soil surface, interception and evapo-transpiration and infiltration decrease, and overland flow and subsurface flow can increase (DeBano et al. 1998; Neary et al. 2005; Zwolinski 2000).

Prescribed fire with low to moderate burn severity such as the type proposed in the Rim-Paunina Project rarely produces adverse hydrologic effects on watershed condition, especially if best management practices are utilized. Prescribed burning would reduce the risk of a lethal wildfire and would simulate the beneficial effects of fire on the landscape and avoid detrimental effects (USFS Press 2008).

**Direct and Indirect Effects**

**Alternative A (No Action)**

The loss of riparian and/or wetland complexes would continue, particularly within the Five Mile Draw area. Mainly due to a lack of disturbance associated with fire exclusion, riparian associated vegetation is being replaced by encroaching lodgepole pine and other drier plant species.

**Alternatives B - E**

Table 107 shows both total acres of proposed activity and the number of acres proposed for treatment that overlap RHCAs by subwatershed and by alternative. These areas of overlap fall into two categories.

First, some RHCA acres in each alternative (approximately 107 acres in Alt B, 98 acres in Alts C and D, and 134 acres in Alt E), although appearing in the GIS layer, may potentially not exist on the ground (based on overlaid satellite imagery). In these units, field verification would occur prior to any treatment, and if the presence of riparian areas is confirmed, these areas would be buffered and marked during layout. Only areas determined to be outside of RHCAs on the ground would be treated.

**Table 107. Acres of Proposed Treatment that Overlap Riparian Habitat Conservation Areas (RHCA)**

| Watershed | Subwatershed | Alt B | RHCA | Alt C | RHCA | Alt D | RHCA | Alt E | RHCA |
|---|---|---|---|---|---|---|---|---|---|
| Little Walker Mountain | Coral Springs | 3,780 | 0 | 789 | 0 | 789 | 0 | 820 | 0 |
| | Crescent Butte | 2,952 | 0 | 2,308 | 0 | 2,308 | 0 | 2,952 | 0 |
| | Little Walker Mountain | 3,259 | 0.4 | 5,425 | 0.4 | 5425 | 0.4 | 5,615 | 0.4 |
| | North Paunina | 2,891 | 107.6 | 3,204 | 65.2 | 3,204 | 65.2 | 3,452 | 83.5 |
| | North Walker | 356 | 18.3 | 832 | 20.6 | 832 | 20.6 | 832 | 20.6 |
| | South Paunina | 2,181 | 167.2 | 2,177 | 143.7 | 2,177 | 143.7 | 2,508 | 161.8 |
| Total | | **12,019** | **293.5** | **14,754** | **229.8** | **14,754** | **229.8** | **16,195** | **266.2** |

Second, all action alternatives include overlap with selected riparian areas to be restored (Table 108). The objective is to return the project area to a greater proportion of open meadow habitat and increase herbaceous diversity. Although restoration activities overlap onto RHCAs as shown on Figure 51 they would not change water quality or yield. Typical activities would include the thinning and removal of most encroaching lodgepole pine and other conifers eight inches diameter or less. Remaining eight-inch diameter at breast height (dbh) trees and greater would provide sufficient tree structure and basal area to maintain the current amounts and timing of runoff during precipitation events, and to provide future wood recruitment. After examining the location, timing, and design of the activities, it was determined that effects would likely be localized and would not have any direct and indirect effects to water quality and water quantity. The timing, duration, or magnitude of overland flow or runoff would not change because of the existing soil characteristics and the lack of mechanisms for soil transport, even during a severe precipitation event. This is due to an extremely low velocity of water plus lack of connection to a perennial water body.

Thinning of lodgepole pine within these RHCAs would be implemented by non-mechanical means and would not result in areas of exposed soil prone to mobilization to the stream channel. Project Design Features common to all action alternatives would be incorporated that would restrict mechanized equipment to the edge of sensitive soils, and prohibit tracked mechanized equipment associated with harvest operations on any wetted soils; permanent or seasonally. These features have been used numerous times on the forest and have proven effective. Deep and highly drained pumice soils of the area are not prone to convey overland flow which could potentially deliver sediment from upslope sources. This has been witnessed throughout the district within projects such as the Davis Fire Recovery, Crescent Lake Wildland Urban Interface Fuels Reduction, Seven Buttes, and Seven Buttes Return. This potential is further reduced as there are no perennial streams within the planning area.

In addition to vegetation manipulation and prescribed burning, restoration activities include approximately one mile of restoration of a non-system road within the RHCA in Unit 25. Restoration activities include subsoiling, camouflaging and decompaction activities in the roadbed in order to encourage vegetation and restore proper hydrologic function. Restoration activities would not occur on any wetted portion of the RHCA. Typically, subsoiling activities use a self-drafting attachment pulled behind machinery that fractures the compacted layers of soil beneath the surface while minimizing surface disturbance.

The combination of removal of encroaching small diameter trees, restoring a frequent and low intensity fire regime in appropriate places and road rehabilitation activities would likely move the area closer to a more historical proportion of meadow habitats and improve storage and delayed release of water into the riparian systems.

**Table 108. Units within the Rim-Paunina Project Area with Riparian Habitat Conservation Areas (RHCA) Proposed for Treatment**

| Unit | Included in Alternatives | RHCA Acres for Treatment | Objectives |
|---|---|---|---|
| 15 | B,C,D,E | 6.3 | Remove all lodgepole pine 8" and less from riparian areas to restore meadow habitat. |
| 20 | B,C,D,E | 3.3 | Remove all lodgepole pine 8" and less from riparian areas to restore meadow habitat. Retain dead and down logs within 150 feet from riparian below 9758 road and upstream to the 400 road to prevent potential erosion by reducing water velocity during the times of year when water is present. |
| 25 | B,C,D,E | 1.1 | Remove all lodgepole pine 8" and less from riparian areas to restore meadow habitat. To provide big game security, maintain a visual buffer between the 9758 road and Five Mile Draw. For habitat diversity, retain 25 percent of dense vegetation in an unmanaged condition. Retain a 20-acre unthinned patch at north end of unit near Five Mile Draw. Restoration activities include subsoiling of non-system road. |
| 35 | B | 55.5 | Clean up dead and down material. Leave all wood that comes into contact w/ channel to prevent potential erosion by reducing water velocity during the times of year when water is present. For habitat diversity, retain 20 percent of dense vegetation with downed wood in an unmanaged condition. |
| 240 | B,C,D,E | 57.9 | Remove all lodgepole pine 8" and less from riparian areas to restore meadow habitat. |
| 285 | B,C,D,E | 15.9 | Remove all lodgepole pine 8" and less from riparian areas to restore meadow habitat. |
| 286 | B,C,D,E | .9 | Remove all lodgepole pine 8" and less from riparian areas to restore meadow habitat. |
| 355 | B,C,D,E | 28.2 | Remove all lodgepole pine 8" and less from riparian areas to restore meadow habitat. |
| 610 | B,C,D,E | 18.3 | Near Boundary Springs, use improvement cut (HIM) prescription except where it overlaps seasonally wetted soil, then non-mechanical removal of small diameter trees to open up the stand for herbaceous diversity. |
| | **Total** | **187.4** | |

In the uplands, a combination of active management that would include thinning trees from below, mechanical treatment of small trees and brush, and prescribed burning would restore conditions favorable to a frequent, low intensity fire regime (where appropriate). Potential for surface erosion results primarily from the exposure of mineral soil by yarding operations, prescribed fire, and the disruption of natural drainage patterns by skid trails and road construction. Although no new road construction is proposed, implementation of the action alternatives would require up to10 miles of temporary road construction. These would be constructed outside of Riparian Habitat Conservation Area Buffers and with Best Management Practices (BMPs), such as proper drainage structures. Following their intended use, they would be restored to proper hydrological condition. Reference the soil quality and transportation sections for more discussion regarding temporary roads. A discussion of restoration of a non-system road within the RHCA and its effects is contained within this analysis.

Observations from past harvest activities on the forest have shown that potential erosion and sedimentation from harvest operations is usually minor when compared to road construction. Thinning activities outside of RHCAs would utilize ground-based equipment with surface erosion being limited to the extent and continuity of bare areas that are typically small and localized (Rice et al. 1972). Activities associated with the restoration of the non-system road would not remove any additional vegetation.

In addition, in the uplands, activities to restore appropriate stands to a frequent, low intensity fire regime do not substantially alter watershed condition. Water quantity or streamflow responses to prescribed fire are generally smaller in magnitude, or almost nonexistent in instances of low severity fire, as compared to a wildfire since it is not the purpose of prescribed burning to completely consume extensive areas of litter and other decomposed organic matter on the soil surface (USFS Press 2008). Of the nine units located within the RHCAs prescribed fire would be applied to units 25, 240, 285, and 286 whereas the remaining units (units 15, 20, 35, 355, and 610) are adjacent to areas where prescribed fire would be applied. A Project Design Feature to retain at least 50 percent of the duff layer in prescribed burning units has been incorporated.

Assessing the complete suite of activities within the watershed that would occur in the uplands down to the RHCAs, due to relatively flat terrain, landscape level filtering mechanisms (including Project Design Features that retain duff), Best Management Practices for maintaining water quality, and lack of connection to deliver sediment, there would be no quantifiable effect to water quality or quantity.

**Cumulative Effects**
Since there are no direct or indirect effects associated with activities associated with the Rim-Paunina project, there can be no cumulative effects associated with past, present, and foreseeable actions. The Three Trails OHV project was referenced in the Affected Environment discussion related to existing water crossing of roads and trails because this was the most informative and logical place.

## Forest Plan Consistency

Alternatives B through E would be consistent with the Forest Plan, specifically Timber Management (TM-1) because the two most relevant Standards and Guidelines are:

***Prohibit timber harvest, including fuelwood cutting, in Riparian Habitat Conservation Areas, except where noted below:***

a) Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in Riparian Habitat Conservation Areas only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other Riparian Management Objectives, and where adverse effects can be avoided to inland native fish. For Priority watersheds, complete watershed analysis prior to salvage cutting in RHCAs.
b) Apply silviculture practices for Riparian Habitat Conservation Areas to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives. Apply silviculture practices in a manner that does not retard attainment of Riparian Management Objectives and that avoids adverse effects on inland native fish.

The Rim-Paunina action alternatives are consistent with TM-1(a) because:

Under **TM-1(a)** it is not a catastrophic event that has resulted in the degradation of riparian habitats, but the chronic result of a fire exclusion policy over the past 100 years. Because of this condition and reduced beaver activity, riparian areas have become encroached upon by lodgepole pine. This has resulted in a reduction in open meadow habitat as well as riparian dependent grasses, forbs, and shrubs

within the draws. INFISH woody debris needs are based upon habitat components within fish bearing streams. Because there are no fish bearing streams in the project area, woody debris needs would not be affected by this project. However, under all action alternatives, downed wood would not be removed from within one tree height of existing channel features. Retaining current as well as future wood recruitment would protect the intermittent and ephemeral channel features from excessive erosional forces, caused by intense precipitation events, and reduce the potential for eroding banks. Trees measuring eight inches and greater in diameter would be retained for future recruitment.

Under **TM-1 (b)** silvicultural practices would be used to achieve vegetation characteristics in areas where open meadow habitat has been lost or degraded by encroachment. The desired characteristic for these select areas is to remove small diameter (eight inches and less) lodgepole pine and restore conditions for riparian vegetation such as grasses, forbs, and shrubs. Removal of the encroaching small diameter lodgepole pine would be similar to conditions following a fire when competition with the pine trees would be decreased, making water and sunlight available to the riparian dependent vegetation underneath. This approach has been successfully used in several stringer meadow projects across the forest to restore riparian vegetation in areas such as Five Mile Draw, Spruce Creek, and Big Marsh.

In those units that have been identified for activity to reduce small diameter lodgepole pine encroachment to restore meadow habitat, the project was designed to exclude mechanized equipment from wetted and riparian associated vegetation areas. There would be no areas of exposed soil prone to mobilization. Removal of coniferous encroachment would restore meadows to a more historic condition and would be beneficial for the recovery of riparian vegetation and hydrologic function (storage and delayed release of water in soils) and maintain a greater diversity of meadow/riparian vegetation for dependent species.

***Road Management:*** The project area contains no inland native fish or their habitats. There is no construction of permanent or temporary roads within the RHCAs. A Forest-wide inspection, operation and maintenance plan for road management is in place in cooperation with applicable partners and has been designed with Best Management Practices found in Appendix B.

***Fire and Fuels Management:*** The closest prescribed fire activity is within four units (units 25, 240, 285, and 286) and borders five others (15, 20, 35, 355, and 610) and the effects associated with the use of prescribed fire and its site-specific effects on the vegetation characteristics for RHCAs is disclosed in this document. Fire suppression and its policies are not an element of this project's proposed activities.

***General Riparian Area Management:*** There are no instream flows. Woody debris objectives have been met and exceeded; reference the Wildlife and Soil Quality sections for specific details. Mechanical equipment associated with activities within RHCAs is excluded from wetted soils; storage and refueling requirements and other intoxicants for equipment is regulated by contract provisions and would occur outside of RHCAs (Project Design Feature).

***Watershed and Habitat Restoration:*** The restoration activities for all action alternatives have been specifically designed to meet and attain RMOs and are detailed in the Aquatic Resources section. There are no INLAND native fish within the project area and it has been determined that wild ungulate impacts are not a contributor to the decline in abundance of meadow habitats nor contribute to non-attainment of vegetation characteristics.

There are no Tier One or Key Watersheds in the planning area.

**Clean Water Act and Executive Order 12088**
The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of all waters to protect the beneficial uses as documented according to Oregon Department of Environmental Quality (ODEQ) criteria.

Action alternatives follow State of Oregon requirements in accordance with the Clean Water Act for protection of waters because application of Best Management Practices (BMPs) were selected and designed using site-specific conditions. The interdisciplinary team has reviewed and incorporated applicable BMP water quality objectives in the design of alternatives and their mitigation measures (also see Appendix A). The Inland Native Fish Strategy was developed (in part) to maintain and restore aquatic ecosystems for dependent species.

It has been concluded there would be no measureable effect to water quality and quantity and the reasons are documented in the Aquatic Resources section in Chapter 3. There are no State of Oregon 303(d) water bodies listed as impaired within the planning area.

**Executive Orders 11988 & 11990 of May 24, 1977**
**Protection of Floodplains and Wetlands**
Executive Order 11988 requires the Forest Service to provide leadership and to take action to (1) minimize adverse impacts associated with occupancy and modification of floodplains and reduce risks of flood loss, (2) minimize impacts of floods on human safety, health, and welfare, and (3) restore and preserve the natural and beneficial values served by floodplains. Executive Order 11990 requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

All action alternatives utilize non-mechanical means to remove small diameter (eight inches and less) conifer encroachment to restore open meadows habitats where they once likely existed. Project Design Features were designed 1) to leave all wood that comes in contact with a channel and 2) non-fish bearing and ephemeral streams would have a one standard tree height or 150 foot no-harvest buffer placed on either side of the steam except for those units specifically designated for riparian enhancement and restoration activities. In this analysis area, riparian area activities are defined as floodplains and wetlands; therefore, all action alternatives comply with the intent of Executive Orders 11988 and 11990, and USDA Departmental Regulation 9500-3.

# Transportation

**Existing Condition**

The following section has been incorporated from the transportation specialist report in its entirety. Within the boundary of the Rim-Paunina analysis area there are approximately 345 miles of road under various private and public jurisdictions that include federal, state, county, and private entities. The existing road system is in general evenly distributed throughout the analysis area, with a somewhat greater abundance of roads being found in the southwest and northeast portions of the analysis area in the vicinity of the Two Rivers North subdivision and between U.S. Highway 97 and Walker Rim.

The majority of roads in the analysis area are located on relatively gentle terrain, with ground slopes rarely exceeding 15 percent. A few roads can be found in midslope positions on slopes up to or even beyond 30 percent; these roads are primarily located along the western face of Walker Rim.

Within the analysis area, there is one Cooperative Road Management Area established by agreement between the Oregon Department of Fish and Wildlife and USDA-Forest Service and adjacent industrial forest land owners. The Walker Rim Green Dot system establishes a network of open and closed roads during the fall rifle-hunting season in the southeastern portion of the analysis area east of U.S. Highway 97.

**Age and Development History of the Transportation System**

The majority of roads within the analysis area have been in existence for more than 40 years, with few additions constructed in the recent past. Some portions of the system dating back to early railroad logging in the early 20$^{th}$ Century are centered on the historic sawmill facility at Mowich, which was sited north of the Two Rivers North subdivision. Some roads that are currently part of the transportation system served in earlier days as locations for railroad grades.

With limited exceptions (and excluding State and County highways), roads in the Rim-Paunina analysis area have been constructed for access to timber harvest areas. A few roads were constructed specifically in support of railroad and utility corridor rights-of-way and a small number of roads on private land have been developed as infrastructure in support of developing subdivisions.

**Road Use Patterns over Time, Now, and in the Future**

The majority of roads within the analysis area, and in particular those roads under Forest Service jurisdiction, have a general pattern of use common to low-standard forest roads in the absence of residential enclaves or developed recreation. With the exception of roads in the vicinity of subdivisions such as Two Rivers North – where off-highway vehicle (OHV) use, and in particular Class 1 All-Terrain Vehicle (ATV) use, is extensive – or of the arterial roads and major collector through routes such as Forest Roads 5835, and 94 or Highways 58 and 97 most roads see little use other than administrative traffic through the spring and summer. Timber sale activity can contribute substantially to daily traffic numbers, but the pattern of such activity is usually isolated in one particular area at any given time.

There was a small use attributed to grazing allotments but that has ended with the abandonment of the allotments. The bulk of use for the majority of roads is in the late summer and fall with the commencement of deer and elk hunting seasons and the matsutake mushroom picking season.

The existing road system is also used by the Union Pacific Railroad road use permits to maintain access to their main rail line running through the analysis area and Mid-State Electric Cooperative to service their electrical lines passing through the analysis area. In addition, certain roads provide access to

Burlington Northern Railroad and Klamath Northern Railroad lines, access to a natural gas transmission pipeline that is located in the south-eastern portion of the analysis area, as well as access to Bonneville Power Association (BPA) and Midstate powerlines that run north to south through the planning area east of Hwy 97. These uses, although not a significant component of the total usage, have occurred for many years and would continue into the foreseeable future.

The anticipated future use patterns would be somewhat reflective of current trends of administrative and timber sale-related use during the summer. However, summer use may change with an increase in ATV traffic, especially on weekends, with the implementation of the Three Trails OHV project which is predicted to increase ridership by up to approximately 5.6 percent per year.

**Primary Destinations of Road System Users**

The bulk of the roads within the analysis area do not generally serve any particular destinations, but instead provide access to areas of interest for various users. For land managers and contractors, these roads serve as access to areas where vegetative management or other land management activities are ongoing or planned. For matsutake mushroom pickers, they provide entry into a number of picking areas in the southwest portion of Crescent Ranger District. These roads also provide access to popular hunting areas such as the Walker Rim area.

**Existing Maintenance Levels and Road Surface Types**

Maintenance Levels define the degree of maintenance required for a specific road and the level of service which that road provides, consistent with road management objectives and maintenance criteria (FSH 7709.58, Transportation System Maintenance Handbook). The five maintenance levels are defined as:

*Maintenance Level 1*: Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resource to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate". Roads receiving Level 1 maintenance may be of any type, class, or construction standard and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at Level 1, they are physically closed to vehicular traffic, but may be open and suitable for non-motorized uses.

*Maintenance Level 2:* Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

*Maintenance Level 3*: Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept" passenger cars. "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users; unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

*Maintenance Level 4:* Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic

management strategy is "encourage" passenger cars. However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times; unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

*Maintenance Level 5:* Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage", except that, unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

The majority of roads, approximately 90 percent, within the Rim-Paunina analysis area are native-surface roads. Those under Forest Service jurisdiction are managed as either being open for high-clearance vehicle traffic (Maintenance Level 2) or as being physically closed so that traffic is eliminated and the roads are in a basic custodial status (Maintenance Level 1) but not prohibited (by Forest Order). The native-surface roads in Maintenance Level 2 status are not maintained on a recurring basis but are instead periodically reviewed to determine maintenance needs necessary to protect adjacent resource values. Some of the native-surface roads in the analysis area are on private land and are variably open to public access, depending on the wishes of those individual landowners or the existence of public rights of way (as in the case of subdivisions within the analysis area).

An additional seven percent of the roads are either categorized as improved native or aggregate-surfaced. Road 94, to the top of Walker Mountain, is maintained to allow passenger car use (Maintenance Level 3), while most of the others are not specifically maintained for passenger car use but are generally readily usable by such vehicles under most circumstances.

The remaining three percent of roads are asphalt or bituminous-surfaced facilities, including State Route 58, and US Highway 97. Most of these routes are under the jurisdiction of entities other than the USDA-Forest Service, but all of the asphalt-surfaced routes are maintained to standards that are represented by Maintenance Levels 4 and 5. Under these maintenance levels, passenger car use is encouraged and the primary emphasis is on traveler comfort, convenience, and safety.

**Table 109. Miles of Roads by Road Surface Type**

| Surface Type | Mileage | Percent of Total |
|---|---|---|
| Asphalt | 12 | 3 |
| Crushed Aggregate | 9 | 3 |
| Improved Native Material (Cinders) | 13 | 4 |
| Native Surface Road | 312 | 90 |

**Table 110. Miles of Roads by Maintenance Level**

| Operational Maintenance Level | Miles |
|---|---|
| Unclassified Other Jurisdiction | 70 |
| M/L 1 (Closed) | 189 |
| M/L 2 (High Clearance Vehicles Allowed) | 143 |
| M/L 3 (Passenger Car Allowed; Low Speed) | 1 |
| M/L 4 (Passenger Car Accepted; Moderate Speed) | 0 |
| M/L 5 (Passenger Car Encouraged; High Speed) | 12 |

**Existing Road Management Objectives**
The existing management objectives for roads within the analysis area are generally managed primarily for land management and administrative purposes; public access is generally allowed but is a secondary consideration except in areas where subdivisions are located or where there is a specific recreation emphasis. Arterial and collector routes (two- and four- digit roads) are generally managed to facilitate a mix of commercial, administrative, and public use, although a few of the collector (four-digit) routes can be designated as single-user routes during timber harvest activity.

With the exception of those roads providing access to recreational facilities or recreational/permanent residences, the seven-digit local road component is managed, when open, to be primarily used by high-clearance vehicles, including OHVs. Passenger car operation is possible on many of these routes, but no special consideration is given to allowing such use. During timber harvest activity, most of these roads are intended to be single-user facilities, given that their combination of narrow travel ways and a lack of frequent, intervisible turnouts preclude opportunities to safely provide for mixed commercial/public traffic.

**Road Densities**
The vast majority of the Rim-Paunina project area (over 99 percent) lies within six different twelfth-field subwatersheds of the Little Walker Mountain Watershed, and this is the area that was used for this transportation analysis. The total road density in all six subwatersheds is 5.1 miles per square mile; total open road density is 4.0 miles per square mile. Total road density of roads under Deschutes National Forest jurisdiction in these subwatersheds is 2.3 miles per square mile and total Deschutes National Forest open road density is 1.1 miles per square mile.

**Table 111. Road Density – Subwatershed Basis (Mile/Square Mile)**

| Subwatershed Name | Operational Open Road Density | Total Road Density |
|---|---|---|
| Corral Springs (**All Roads**) | 5.6 | 5.9 |
| Corral Springs (**FS Roads Only**) | 0.4 | 0.7 |
| Crescent Butte (**All Roads**) | 4.3 | 6.3 |
| Crescent Butte (**FS Roads Only**) | 1.0 | 3.0 |
| Little Walker Mtn. (**All Roads**) | 3.0 | 5.3 |
| Little Walker Mtn. (**FS Roads Only**) | 2.1 | 4.4 |
| North Paunina (**All Roads**) | 3.9 | 5.4 |
| North Paunina (**FS Roads Only**) | 1.8 | 3.4 |
| North Walker (**All Roads**) | 3.7 | 3.9 |
| North Walker (**FS Roads Only**) | 0.1 | 0.2 |
| South Paunina (**All Roads**) | 3.6 | 5.1 |
| South Paunina (**FS Roads Only**) | 2.3 | 3.8 |

### *Desired Transportation System Conditions*

**Management Direction**

The desired condition is to provide a road system that is safe, affordable, has minimal ecological effects, and meets immediate and projected long-term public and resource management needs.

The current direction for management of the road system is found in the 1990 Deschutes National Forest Land and Resource Management Plan (LRMP). According to the LRMP, the goal of the Forest's transportation system is "to plan, design, operate, and maintain a safe and economical transportation system providing efficient access for the movement of people and materials involved in the use and protection of National Forest Lands" (LRMP pg. 4-71).

**Direct and Indirect Effects**

**Alternative A**

Under Alternative A, the existing road system would experience no changes in its current status and condition. Roads that are currently in custodial status (Maintenance Level 1) would remain closed and open roads would continue to provide access for recreational, commercial, and administrative functions in the same manner that they currently do. Open roads would receive no maintenance beyond that which is normally scheduled, which is generally devoted to the higher standard roads.

**Action Alternatives B, C, D, and E**

The Rim-Paunina area is limited to intermittent and ephemeral steams and well drained soils; therefore potential effects to water quality from roads is very low to non-existent (reference the Fisheries and Aquatics section in this Chapter for more details). As a function of use during harvest activities, road maintenance activities would be conducted on roads designated for use. As a direct effect, some roads that do not receive recurring maintenance, primarily low standard roads in the Maintenance Level (M/L) 2 category, would see some improvements in both safe drivability and in their ability to handle surface runoff and the resultant sediment. Native surface Maintenance Level 2 roads, as a result of use and infrequent blade maintenance, tend to develop shallow ruts in their wheel tracks, which can concentrate shallow flow and lead to increased sediment rates (Foltz 1991). Post-haul maintenance that would occur on these roads would restore flat road surfaces (without ruts) that would be capable of producing less sediment than their rutted counterparts; post-haul waterbarring would also remove surface runoff from the erosive road surfaces.

The type of work that would be expected to be performed as maintenance in timber sale contract provisions include:

- Brushing for improved sight distances
- Removal of hazard trees
- Blading and shaping of traveled way
- Restoring existing surface drainage features, such as drain dips or outlet ditches
- Cleaning culverts and ditches
- Installing water bars after periods of haul

Dust abatement, primarily using water as the dust palliative, would be performed as necessary to maintain safe driving conditions. This would have a secondary effect of maintaining a relatively well-bonded road surface free of the highly erosive pulverized ash "flour" that can occur on native surface roads under heavy use conditions.

A portion of the commercial hauling would be occurring on roads managed by the Fremont-Winema National Forests. In particular, hauling activities would occur on the Fremont-Winema segments of roads

5835, 94, 9753, 9755, and 9774. The maintenance requirements on these roads would be the same for those Deschutes National Forest roads being used to implement planned activities within the Rim-Paunina planning area. In addition to this, fees would be collected from commercial haulers on Road 94 and the segment of Road 9774 from its junction with US 97 to its junction with Road 5835. These fees, which are intended to offset the commercial haulers' commensurate share of the cost to replace road surface rock worn down by use, is currently assessed by the Fremont-Winema National Forests at $0.42/mbf/mile.

**Table 112. Haul Road Miles (Forest Service Jurisdiction) by Maintenance Level**

| Operational Maintenance Level | Length | | | |
|---|---|---|---|---|
| | Alt B | Alt C | Alt D | Alt E |
| 1 – Basic Custodial Care (Closed) | 58.1 | 55.7 | 55.7 | 58.1 |
| 2 – High Clearance Vehicles | 110.0 | 103.4 | 103.4 | 110.0 |
| 3 – Suitable For Passenger Cars | 0.7 | 0.7 | 0.7 | 0.7 |
| 4 – Moderate Degree of User Comfort | 1.5 | 1.5 | 1.5 | 1.5 |

**Alternative B**

Commercial haul activities and other vegetative treatments proposed in this alternative would result in the use of approximately 170 miles of system roads under U.S.D.A.-Forest Service jurisdiction. During the course of activities, 58 miles of roads currently closed and in custodial status as Maintenance Level 1 roads would be opened. This would result in some potentially short-term increase (five years or less) in open-road densities. The majority of maintenance work would be performed on the 168 miles of Maintenance Level 1 and 2 roads used for commercial activities, in particular blading and brushing.

**Alternatives C and D**

Under these alternatives, 161 miles of system roads would be used for commercial haul activities and other vegetative treatment proposals. Activities would result in the opening of 56 miles of Maintenance Level 1 roads, resulting in a short-term increase in open road density, but – as with Alternative B – not all roads would be opened at the same time and all would be closed at the end of activities. Under these Alternatives, approximately 159 miles of Maintenance Level 1 and 2 roads would receive the majority of maintenance effort, in particular the native surface roads.

**Alternative E**

Commercial haul activities and other vegetative treatments proposed in this Alternative would result in the use of approximately 170 miles of system roads under U.S.D.A.-Forest Service jurisdiction. During the course of activities, 58 miles of roads currently closed and in custodial status as Maintenance Level 1 roads would be opened. The majority of maintenance work would be performed on the 168 miles of Maintenance Level 1 and 2 roads used for commercial activities, in particular blading and brushing.

**Temporary Roads**

The relatively gentle topography within the analysis area has led to a tradition of employing ground-base yarding systems to remove logs to landings. Temporary roads have customarily been constructed to provide access to those landings that were within the interior of units or otherwise not immediately adjacent to existing portions of the transportation system. Older temporary roads that had not revegetated were added to the transportation system in the late 1970's in response to a directive that all existing wheeltracks be inventoried. With the advent of the requirement in The National Forest Management Act of 1976 that temporary roads be revegetated within 10 years, more attention has been paid to improving circumstances for revegetation on compacted temporary road surfaces, and within the last decade they have been aggressively treated by decompaction with tractor-mounted winged subsoiling tools.

Temporary roads would be constructed primarily on flat ground (slopes less than 10 percent) and excavation and construction of embankments would be negligible. Temporary roads would be built to low construction standards, with constraints of grade, curve radius, compaction, surfacing, and width being tailored to the minimum capabilities of the intended user vehicles.

Temporary roads, by their nature, are not intended for mixed vehicle use, nor are they intended to remain as identifiable facilities after the administrative need for their use has ended. At the completion of harvest and post-harvest activities (treatment of residual slash), all temporary roads would be barricaded to eliminate motor vehicle access and would be restored by decompaction as part of post-harvest soil remediation activities to facilitate their return to vegetative productivity.

Effects of temporary roads stem directly from compaction and include loss of infiltrative capacity, increased erosion potential, and dramatically reduced vegetative productivity. Compaction results in increased bulk density and reduced porosity, primarily through the loss of macropores, leading to reduced aeration and drainage, as well as disruption to microbial populations that causes that reduced productivity and increased erosion potential (Elliot et al. 1999). Bulk density has been shown in several studies to reduce tree growth not only within the compacted area itself, but also for trees adjacent to the compacted area because of root zone compaction (Froehlich 1979; Heilman 1981; Helms and Hipkin 1986; Conlin and van den Driessche 1996) as a result of increased root impedance and disrupted microbial processes. Natural recovery from compaction can be variable, with the more dramatic reduction in bulk density coming near the surface of the soil profile, but in general the rate of natural, unassisted recovery is slow (Froehlich et al. 1985). These effects would be reduced by subsoiling so that they generally apply only over the short term – five years or less. Because of the moderate ground slopes and high to excessive infiltration rates of the soils adjacent to these temporary road beds, sedimentation effects would be localized to upland areas immediately adjacent to the roads.

Temporary road construction is sometimes required to facilitate the economical harvest of trees from a particular harvest unit. Under Alternative A, there would be no treatments within the analysis area and no temporary roads would be built. Previously constructed temporary roads that were not treated by subsoiling and have not naturally recovered would continue to provide some effect to vegetative productivity, surface/groundwater hydrology, and sediment production although the generally gentle ground slopes and the nature of the surrounding soil types would localize these effects. Such effects would be slowly diminishing as these compacted roadbeds slowly decompact.

Within the Rim-Paunina analysis area, implementation of Alternatives B, C, D, or E would result in the construction of temporary roads and would result in the irretrievable commitment of acreage to use as road beds (Figure 53). Under the Action Alternatives there would be, over time, a baseline of untreated temporary roads having been constructed within the analysis area as individual units are harvested by various timber sales with a certain degree of erosion potential and reduced vegetative productivity. As roads are treated by subsoiling, erosion potential would decline. The productive capability would increase over time, subsequent to subsoiling as subsidence returned the soil profile to a more natural ratio of macroporosity and microporosity. Mileage of temporary road construction per Alternative is shown in the table below.

**Table 113. Temporary Road Estimate by Alternative**

| Alternative | Estimated Mileage |
|---|---|
| Alternative B | 9.2 |
| Alternative C | 6.5 |
| Alternative D | 6.5 |
| Alternative E | 8.3 |

### Cumulative Effects

There would be no incremental or additive effects that overlap the analysis area except for the implementation of the Deschutes National Forest Travel Management Project, released in August, 2011. Under Travel Management, motorized access off of designated routes (shown on the Motor Vehicle Use Map associated with the Travel Management project) is prohibited, as is off-road travel (unless in a designated area). The Rim-Paunina decision has no effects associated with public access.

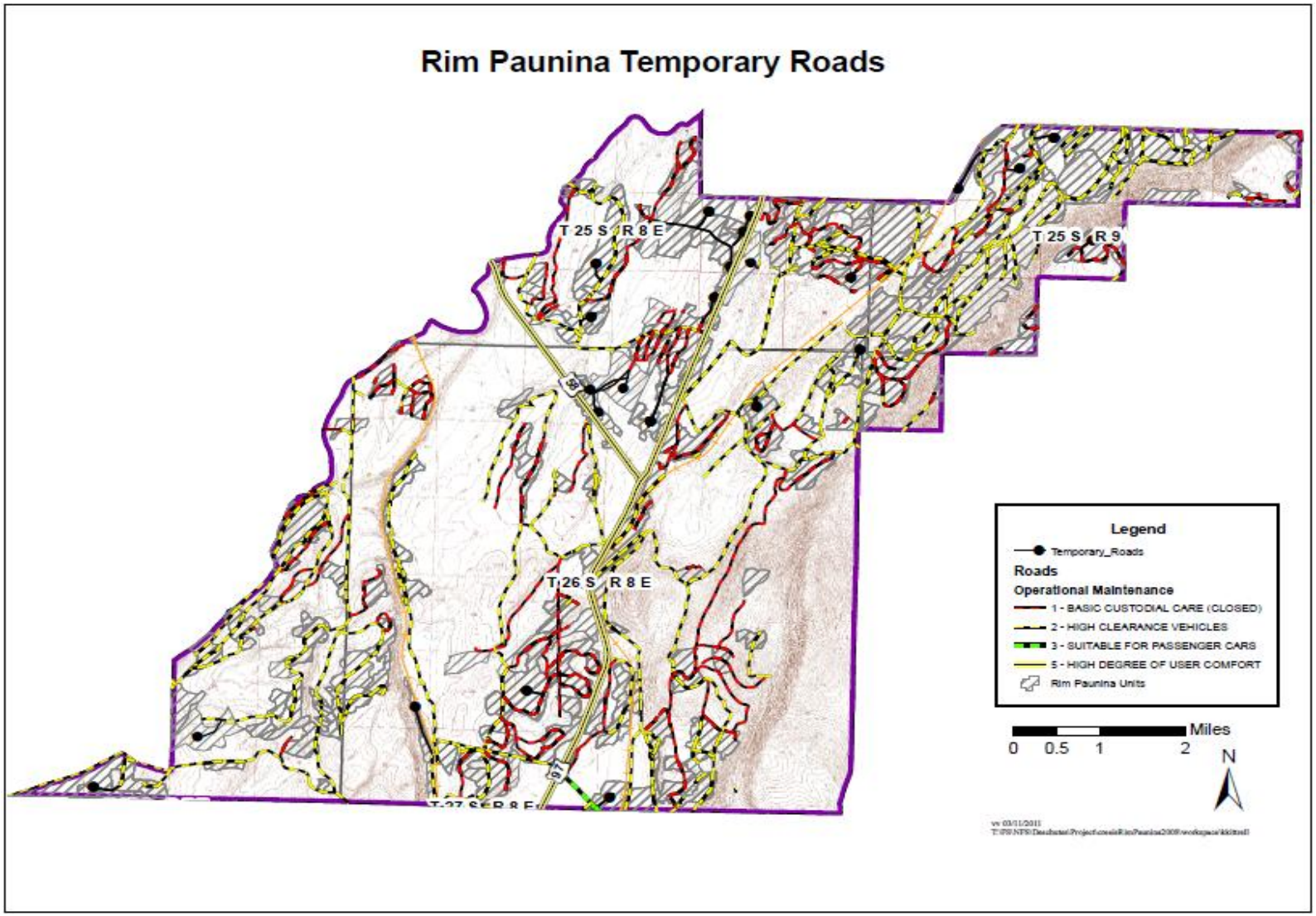



**Figure 53. Rim-Paunina Potential Temporary Road Construction**

# Cultural Resources

**Management Direction**
Management direction for cultural resources is found in the Deschutes National Forest Resource Management Plan, in the Forest Service Manual section 2360, in Federal Regulations 36CR64 and 36CFR800 (amended December 2000), and in various federal laws including the National Historic Preservation Act (NHPA) of 1966 (as amended), the National Environmental Policy Act, and the National Forest Management Act.

In general, the existing management direction asks the Forest to consider the effects on cultural resources when considering projects that fall within the Forest's jurisdiction. Further direction indicates that the Forest will determine what cultural resources are present on the forest, evaluate each resource for eligibility to the National Register of Historic Places (National Register), and protect or mitigate effects to resources that are eligible.

Relevant Forest Plan Standards and Guides include:
CR-2, which states that cultural resource properties located during inventory will be evaluated for eligibility to the National Register.

CR-3, which states that in concert with inventories and evaluations, the Forest will develop thematic National Register nominations and management plans for various classes of cultural resources.

CR-4, which indicates that project level inventories or the intent to conduct such shall be documented through environmental analysis for the project.

**Desired Condition**
The desired condition would be to know the location and extent of all cultural resources, to have evaluated each one for eligibility to the National Register, and to have developed management plans for all eligible properties.

**Existing Condition**
New survey was conducted on approximately 381 acres of proposed treatment areas where there was no previous inventory survey documented. This inventory included areas on ridges and associated spurs. No new cultural resource sites were identified during the new survey. This brings the total amount of survey coverage within the project planning area to 36,447 acres, or 91 percent of the project area.

Sixty five cultural resource sites are present within the planning area. Forty-four of the sites have been evaluated for eligibility to the National Register of Historic Places (NRHP). Of these, 10 are eligible and 34 are not eligible. The remaining 21 sites have not been evaluated for eligibility. There are 30 sites dating from the historic era (at least 50 years old). Thirty-five sites are prehistoric in age (inferred from the presence of stone tool technologies).

Sites from the historic period include refuse dumps, refuse scatters, historic structure remains, a utility corridor, culturally modified trees, remains of historic era railroad construction camps, historic town sites, and pumice mines. Prehistoric site types represented include lithic scatters, lithic scatters with flaked stone tools, lithic scatters with ground stone tools, possible rock shelters, and vision quest sites.

Review of spatial and tabular data for the 65 sites indicates that one eligible and 11 unevaluated sites are located within proposed treatment units where fuels or vegetation treatments or both are planned.

**Direct and Indirect Effects**

**No Action**

There would be no change to the current condition and no Federal action; therefore there would be no direct, indirect, or cumulative effect on cultural resources. Custodial management of forest resources such as road maintenance and wildfire suppression would continue.

**Action Alternatives**

Due to the sensitive nature of the information regarding cultural resources, the report submitted to the State Historic Preservation Office is on file at the Forest headquarters, the Crescent District office, and at the State office.

Following guidelines in a 2003 Regional Programmatic Agreement (PA) among USDA-Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Office (SHPO), a finding of "*Historic Properties Avoided*" was determined under Stipulation III(B)2 of the PA. The Forest finds that there are historic properties but the undertaking will have no effect on them as defined by 36 CFR 800.16(i). In addition to avoidance, this finding is based upon a Mitigation Measure to "pre-treat" the buffer around identified stacked rock feature sites by removing fuels prior to implementation of prescribed fire. The intent is to lessen the risk of prescribed fire in the vicinity of this site type. These areas would be identified in the implementation plan following the decision and would be coordinated between the district archaeologist, timber sale administration, and all post sale work accomplished by contract and force account workers. This measure has been used with success through the forest on similar sites and has been highly effective and reliable.

# Scenery

**Existing Condition**

For the purposes of this analysis, the existing Forest Plan direction on scenic quality has been used. However, whenever possible, Scenic Integrity Objectives have also been displayed and discussed. Further direction regarding scenery management is found in Forest Service Manual 2380 (Landscape Management). Also, only effects to the foreground area are discussed, because proposed vegetation changes to middleground would not be noticeable as viewed from the selected viewer locations, which have been identified as Highways 58 and 97 in the vicinity of Walker Rim.

The areas along these highways are classified in the Deschutes Forest Plan as "**Partial Retention"** or on the corresponding scenery management system as "slightly altered landscape with Medium Scenic Integrity Level."

The scenery in the Rim-Paunina analysis area is undergoing a gradual but noticeable change, particularly in the ponderosa pine that borders the highway. Fire exclusion has allowed smaller trees to obstruct the view of large ponderosa pine trees. Also, lack of periodic, low-intensity fire has likely exacerbated conditions where an endemic disease called dwarf mistletoe is spreading throughout the stands. Despite what is viewable from the highway, many of the large ponderosa trees do not appear healthy and mortality is apparent throughout the stands. This condition is contrary to visitor expectations for scenic views of central Oregon's high desert forests.

Large trees make up a desired component of scenic quality and they likely represented a greater portion of the landscape in the past. In the past two decades, understory thinning projects have begun to be implemented along the scenic view areas in an effort to change this trend. However, remaining in the foreground, especially along Walker Rim are landscapes where lodgepole pine and other fire intolerant species have encroached into ponderosa pine stands, blocking views and preventing the development of large diameter trees which historically dominated these forests.

In stands of lodgepole pine in the project area, there are generally two types of scenic views of forests observable from the highways. One type has experienced bark beetle infestations in the 1990s and trees have died and fallen over with signs of wood cutting or salvage activity. The other has experienced relatively little management activity and could be characterized as dense, with sparse crowns and pockets of insect and disease, appearing near the end of a normal 80 to 100-year life cycle.

On a larger landscape, large wildfires and other forest disturbance processes are especially visible and accessible to the forest visitor along major travel corridors to the north. These include the Davis Fire (Highway 46), Road 18 and Bessie Butte Fires (Highway 97), Awbrey Hall Fire (Highway 46 near Bend), and the Skeleton Fire, B&B, Cache Mountain and Link Fires (Highway 20). These events tend to change the landscape character to "distinctive," altering scenery to a degree that is perceived by many to have deviated from the landscape characteristics that are valued for their aesthetic quality (that is, it no longer appears as natural, or whole). Landscapes are primarily viewed by two types of public: casual forest visitors who mainly are from outside the Central Oregon area, and local residents who tend to be more familiar with forest succession and processes.

Table 114 displays the Scenic Views categories (by Visual Quality Objective or VQO) within the Rim-Paunina analysis area. Most of the "Partial Retention Foreground" is located along Highways 58 and 97. Most of the Partial Retention Middleground is found along Walker Rim.

**Table 114. Acres of Scenic Views Management Area by Visual Quality Objective in the Rim-Paunina Analysis Area**

| Visual Quality Objective | Acres |
|---|---|
| Partial Retention Foreground | 4,164 |
| Partial Retention Middle ground | 994 |

**Direct and Indirect Effects**
**Alternative A**
This alternative maintains the status quo and would continue along the current trajectory toward a stand replacement event under a passively managed landscape. Along Highways 58 and 97, dense stands with large trees would continue to be at risk to a large-scale disturbance, blocking views into the stands as the understory develops. The higher density of ponderosa pine stands masks the appearance of large trees and delays the development of fire tolerant cohorts by many decades.

In lodgepole pine, although this relatively short-lived species evolves with disturbance processes that reinitiate stand renewal approximately every century, the stands within the scenic travel corridor would continue to appear unhealthy to many visitors.

## Effects Common to All Action Alternatives

**Direct and Indirect Effects**
**Alternatives B, C, D, and E**
Prescriptions for the action alternatives are designed to thin the understory and retain the largest trees and healthiest-appearing crowns. Table 116 displays total treatment acres proposed within Partial Retention Foreground areas. Table 117 displays the proposed acres in more detail, showing the type of treatment.

For understory thinning (HTH) within the immediate foreground area in ponderosa pine, large yellow-barked overstory trees would be dominant throughout this viewshed and compliment adjacent areas that have implemented similar vegetative treatments. Within the scenic corridor, all larger trees 21 inches and greater would remain. Fifteen percent retention areas with younger trees would result in greater diversity for scenic views, as well as prescriptions that incorporate heterogeneity.

Within the lodgepole pine stands and improvement harvest units (HIM), stands that lack visual diversity would improve over time as younger trees regenerate after tree removal. Stands would appear healthier with fuller crowns, as most of the dominant trees most likely would remain.

Alternatives D and E respond to Key Issue #2 and have a focused long-term strategy to address dwarf mistletoe in the overstory, primarily in stands where ponderosa pine is the dominant species. In these stands, vegetative prescriptions and management-induced mortality to the overstory trees has the potential to affect scenic views for the short-term when viewed from the highways. Unit 775 is the only potentially visible unit identified for a prescription for mistletoe reduction and it is within ¼ mile of Highway 97, although it does not border the roadway. This stand was evaluated as having a “moderate” level of mistletoe infection. It also is comprised of several species of overstory trees, including ponderosa pine.

Visual impact assessment of on-site conditions has determined this unit would not be visible and would not alter the scenery as viewed by the traveling public because of screening from the site topography. Also, there are suitable healthy overstory species such as sugar pine to be retained.

The scenic resource objective is to lessen the evidence of human activity throughout Foreground areas; therefore the proposed activities have been designed to be subordinate to the larger landscape in order to be consistent with the standards and guidelines for scenic views within the Deschutes Forest LRMP.

Project Design Features have incorporated measures such as design and layout of skid trails and landings to minimize visibility. Landings closer than 200 feet to scenic travel corridors and access roads would be reviewed and approved on a case by case basis. To minimize soil contrast, all visible slash would be handpiled and disposed within two years, or a slashbuster would be utilized, which would also minimize potential smoke on the highway from prescribed burning operations. No marking paint, tags, ribbons, or boundary signs would be visible following project completion. Large diameter trees (21 inches and greater) would not be harvested unless they meet specific criteria related to forest health and public safety, as described in the Forest Plan. These measures have been used on the nearby Davis Fire Recovery Project as well as numerous other sales on the forest. They have proven to be highly effective and practical to implement.

In all Action Alternatives the project proposes a site-specific amendment to the Deschutes Land and Resource Management Plan to utilize prescribed fire in larger than five acre blocks of Partial Retention Foreground areas of Scenic Views along Highways 58 and 97 (LRMP M9-90) for seven units. Table 115 gives a brief description of the units affected by the Forest Plan Amendment and their locations along the highway, the unit numbers, as well as the approximate number of acres per unit that would be visible. This would not likely change how travelers view the landscape. Since the 1990 Forest Plan was implemented, viewers have become more knowledgeable on the role and benefits associated with a frequent, low intensity fire regime in the appropriate places. All other Standards and Guidelines associated with the Forest Plan and scenery (M9-90) such as low intensity fire and limited scorch heights would be consistent. A Forest Service landscape architect has met on-site with the Crescent District Silviculturist to review these proposed actions.

**Table 115. Description of Areas for Alternatives B, C, D, and E where the Inventoried Visual Quality Objectives is Partial Retention (Scenic View Foreground Management Area) and Underburning is Proposed**

| Unit | Description | Treatment Acres proposed for use of prescribed fire | | Gross Unit Acres |
|---|---|---|---|---|
| | | Approximate Scenic View Acres Visible from Hwy | Total Scenic View Acres | |
| **SV-2 Partial Retention Foreground** | | | | |
| 70 | West side of Highway 97 at mile marker 193 | 35 | 140 | 176 |
| 115 | Northeast side of Highway 58 between mile markers 83 and 84 | 18 | 18 | 18 |
| 145 | West side of Highway 97 between mile marker 194 and the Highway58/97 junction. | 18 | 18 | 18 |
| 430 | West side of Highway 97 at mile marker 198 | 10 | 67 | 101 |
| 865 | East side of Highway 97 between mile markers 193 and 194 | 25 | 51 | 51 |
| 870 | East side of Highway 97 between mile marker 194 and the Highway 58/97 junction | 29 | 64 | 145 |
| 3015* | Southwest side of Highway 58 between mile markers 83 and 84. | 27 | 110 | 127 |
| **Total** | | 162 | 468 | 636 |

* This unit is not in Alternative B

In Partial Retention Middleground areas on Walker Rim, “Fuels Only” prescriptions include small diameter thinning by hand, disposal of piles, and prescribed burning. The remaining “Fuels Only” prescriptions would include maintenance of a frequent fire regime including slashbusting and mastication of brush followed by prescribed burning. None of the activities would be evident from the highway because all activities would be below the tree canopy and most of the structure seen from the highway

would remain the same. There would be no human-caused openings (Forest Plan Standards and Guidelines M9-19 and M9-46). Slash from thinning and tree removal activities, or other visible results of management activities will be obvious to the casual forest visitor within two years following activity (Forest Plan Standards and Guidelines M9-18 and M9-44).

**Table 116. Active Management in Scenic Views by Acres**

| Visual Quality Objective | Alt. B | Alt. C | Alt. D | Alt. E |
|---|---|---|---|---|
| Partial Retention Foreground | 1,380 | 1,270 | 1,270 | 1,435 |

***Alternative B units***:
**HIM:** 50, 55, 60, 65, 90, 110, 130, 135, 140, 150, 155, 165, 166, 167, 235, 415, 775, 780, 860, 940, 945, 1050, 1051.
**HTH:** 70, 95, 115, 145, 160, 400, 405, 410, 425, 430, 865, 870, 1045.

***Alternative C***:
**HIM:** 50, 60, 65, 90, 110, 135, 140, 155, 165, 166, 167, 235, 775, 860, 940, 945, 1050, 1051.
**HTH:** 70, 115, 145, 160, 400, 405, 410, 425, 430, 865, 870, 1045.
**Fuels Only:** 3015, 3040, 3050

***Alternative D:***
**HIM:** 50, 60, 65, 90, 110, 135, 140, 155, 165, 166, 167, 235, 860, 940, 945, 1050, 1051.
**HTH:** 70, 115, 145, 160, 400, 405, 410, 425, 430, 865, 870, 1045.
**HSG:** 775
**Fuels Only:** 3015, 3040, 3050

***Alternative E:***
**HIM:** 50, 55, 60, 65, 90, 110, 135, 140, 150, 155, 165, 166, 167, 235, 415, 860, 940, 945, 1050, 1051.
**HTH:** 70, 95, 115, 145, 160, 400, 405, 410, 425, 430, 865, 870, 1045.
**AltMist:** 775
**Fuels Only:** 3015, 3040, 3050

**Table 117. Prescriptions in Foreground Retention by Acres**

| Treatment | Alt. B | Alt. C | Alt. D | Alt. E |
|---|---|---|---|---|
| Lodgepole Improvement (HIM) | 836 | 593 | 575 | 710 |
| Understory Thinning (HTH) | 544 | 514 | 514 | 544 |
| Mistletoe Treatments (HSG and AltMist) | 0 | 0 | 18 | 18 |
| Fuels Treatments only | 0 | 164 | 164 | 164 |
| **Total** | **1,380** | **1,270** | **1,270** | **1,435** |

### Cumulative Effects

There are no past, present, or foreseeable actions along the scenic travel corridors throughout central Oregon that have the potential to change or intensify the effects disclosed in this analysis. North of the project area from La Pine to the city of Bend on Highway 97, the Lava Cast project has thinned "black bark" ponderosa pine and the result has been improved scenic views to a landscape where larger trees are highlighted and views to the Cascade mountain range are opened. Also, in ponderosa pine, similar prescriptions to those planned for Rim-Paunina are planned for the BLT Project north along Highway 58 and Odell Butte.

## Public Health and Safety

Under each action alternative, danger trees would be removed from along all haul routes. The signing of project activity areas in addition to notification of additional project-related traffic would promote a safe environment for forest visitors during project implementation. Implementation of action alternatives would increase the potential for encounters on roadways between forest visitors and equipment associated with harvest. This elevated level of risk would be present for the short-term (approximately five years). Safety measures such as informational signing, flaggers, and road maintenance activities, such as brushing roads for increased visibility, would be enforced through the timber sale contract provisions.

The work environment during all phases of harvest operations would be physically demanding and potentially hazardous; effects to worker health and safety would be possible. Activities with the highest potential for serious injury would include tree felling and potential helicopter operations (helicopter may be used for prescribed fire ignition). All project activities carried out by Forest Service and Forest Service contract employees would comply with State and Federal Occupational Safety and Health Administration (OSHA) standards. All Forest Service project operations would be consistent with Forest Service Handbook 6709.11 (Health and Safety Code).

People who suffer from breathing ailments may experience some difficulty during periods of prescribed burning, especially during atmospheric conditions that do not favor dispersion of smoke. The greatest risk of exposure to airborne toxins from prescribed fires or wildfires would be to firefighters and forest workers implementing the prescribed burning. Although OHV riders and dispersed campers may encounter prescribed burning operations while on an overlapping designated trail, it is unlikely any members of the general public would be exposed to toxin levels adverse to human health. This is because the implementation of prescribed burning operations in the Rim-Paunina analysis area would be relatively far from populated areas and burn prescriptions are designed to lessen the release of particulate matter. Also, Project Design Features were developed in order to reduce risk to visitors as a result of fuel hazard abatement activities. Slash treatment directly adjacent to the highways is limited to methods that do not include prescribed fire. Acceptable methods may include hauling piles away, or mastication (e.g. "slash busting").

The Forest Service voluntarily follows the guidelines assigned by Oregon Smoke Management to limit state-wide exposure on a cumulative basis, in compliance with the Clean Air Act. Forest workers and firefighters can face unhealthy levels of smoke when patrolling or holding fire lines on the downward edge of a wildfire or prescribed fire, or while mopping intense hot spots. In most cases, measures such as education on the effects of short and long term exposure, rotation out of the smoke, and the use of respirators can reduce exposure levels. OSHA regulates exposure to hazardous materials in the workplace. All project activities carried out by Forest Service and Forest Service contract employees are designed to comply with State and Federal OSHA standards.

The Clean Air Act lists 189 hazardous air pollutants to be regulated. Some components of smoke, such as polycyclic aromatic hydrocarbons (PAH) are known to be carcinogenic. Probably the most carcinogenic component is benzo-a-pyrene (BaP). Other components, such as aldehydes, are acute irritants. In 1994 and 1997[38], air toxins were assessed relative to the exposure of humans to smoke from prescribed and wildfires. The five toxins most commonly found in prescribed fire smoke were:

[38] Results of an April 1997 conference to review the results of health studies and develop a risk management plan for the protection of fire crews were published by Missoula Technology Development Center in Health Hazards of Smoke, Technical Report 9751-2836-MTDC.

*Particulate matter* - Particulates are the most prevalent air pollutant from fires, and are of the most concern to regulators. Research indicates a correlation between hospitalizations for respiratory problems and high concentrations of fine particulates (PM2.5, fine particles that are 2.5 microns in diameter or less). Particulates can carry carcinogens and other toxic compounds. Overexposure to particulates can cause irritation of mucous membranes, decreased lung capacity, and impaired lung function. Particulate matter is analyzed for each alternative in Chapter 3, Air Quality.

*Acrolein* - An aldehyde with a piercing, choking odor. Exposure severely irritates the eyes and upper respiratory tract.

*Formaldehyde* - Low-level exposure can cause irritation of the eyes, nose and throat. Long-term exposure is associated with nasal cancer.

*Carbon Monoxide (CO)* - reduces the oxygen carrying capacity of the blood, a reversible effect. Low exposures can cause loss of time awareness, motor skills, and mental acuity. Also, exposure can lead to heart attack, especially for persons with heart disease. High exposures can lead to death due to lack of oxygen.

*Benzene* - Benzene causes headache, dizziness, nausea and breathing difficulties, as well as being a potent carcinogen. Long-term exposure can cause anemia, liver and kidney damage, and cancer.

The closest Designated Area (population centers or other areas requiring protection under State or federal air quality laws or regulations) to the analysis area is the city of Bend, Oregon; the communities of Crescent, Sunriver, and La Pine are closer to the analysis area but are not as highly populated.
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# Social and Economic Analysis

Social and economic elements, which are interrelated and interdependent with ecological elements, comprise the human components of the ecosystem.

The implications of resource management decisions for the Rim-Paunina Project to social and economic values are of interest to the residents, business owners, and users of the area. These people have made their interests known through an organized collaborative group directed by the Central Oregon Intergovernmental Council and represent a broad array of interests (Public Participation, Chapter 1). Their interests, issues, and concerns have been incorporated into the NEPA process through the development of issues and disclosure of effects in Chapter 3.

This section focuses on:

1. A review of the social and economic conditions of Klamath County, Oregon, using the latest census and other sources of data.
2. A review of key social and economic relations between the communities and the uses and services provided by the Federal lands in the Rim-Paunina analysis area.
3. A discussion about how the alternatives affect pertinent and relevant economic factors that are important to the community.

**General Social and Economic Features**

The primary area of consideration is Klamath County, Oregon. According to the US Census 2006 estimate, the population of Klamath County was 66,438. The county covers an area of 6,136 square miles: the population density is currently 11 persons per square mile. The population growth of the county compared to the state, according to the Bureau of Economic Analysis Regional Economic Information System (BEA REIS 2006) Table CA30 was 31 percent from 1970 to 2006. County population growth did not keep pace with state and national growth.

For the population in the 40-54 age bracket (Baby Boom in 2000) in Klamath County, grew the most from 1990 to 2000. The percentage of young people under age 20 declined slightly while the percentage of people 65 years and older increased slightly.

By far, whites are the most numerous ethnic group. Next are Hispanic at 7.8 percent of the population followed by a little over 4 percent American Indian and Alaska Native.

**Economic Conditions**

Historically, Klamath County has devoted its economic base to farming, timber, and wood products manufacturing. Although these industries provide a smaller contribution to the county's current economic activity than they once did; they are still important in community identity and local politics.

The largest employer in the area is Sky Lakes Medical Center; however, few or no residents of Crescent or Gilchrist are employed there. In Klamath County, the Medical Center is followed by Klamath County School District and Jeld-Wen, a company that manufactures windows and doors. Recreation – including fishing, hunting, and hiking – contribute to the appeal of the area and its economy. Crater Lake National Park, which attracts approximately half a million visitors a year, also contributes to the local economy.

**Employment**

From 2001 to 2008, total employment in Klamath County increased from 32,576 jobs to 34,439 jobs. The principal industrial sectors in Klamath County remain the same. They are government and government

enterprises. The second largest is retail trade followed by health care and social assistance. Between 2001 and 2008, government and government enterprises lost a few jobs, while retail trade gained more than 150 jobs. The health care and social assistance sector gained more than 700 jobs. Other important employment sectors in Klamath County are the manufacturing, accommodation and food services sector, farm employment, and construction. A major change over the five years from 2001 to 2008 was the decline in jobs in the forestry, fishing, and related activities sector. This sector declined by 17 percent to 628 jobs.

**Table 118. Klamath County Employment**

| | **Full and Part-time Employment by Year** | | | |
|---|---|---|---|---|
| | **2001** | **2004** | **2006** | **2008** |
| Total employment | 32,576 | 33,219 | 35,441 | 34, 439 |
| Farm employment | 2,038 | 2,078 | 2,065 | 1,752 |
| Nonfarm employment | 30,538 | 31,141 | 33,376 | 32,867 |
| Forestry, fishing, related activities, other 1/ | ***755*** | ***741*** | ***628*** | ***NA*** |
| Mining 1/ | ***14*** | ***30*** | ***78*** | ***NA*** |
| Utilities | 92 | 121 | 122 | 130 |
| Construction | 1,933 | 1,706 | 2,213 | 1,855 |
| Manufacturing | 2,740 | 2,754 | 2,872 | 2,473 |
| Wholesale trade | 769 | 788 | 919 | 951 |
| Retail trade | 3,983 | 3,974 | 4,198 | 4,152 |
| Transportation and warehousing | 1,015 | 972 | 1,060 | 1,037 |
| Finance and insurance | 919 | 1,256 | 869 | 930 |
| Real estate and rental and leasing | 1,151 | 1,182 | 1,435 | 1,652 |
| Professional and technical services 1/ | 1,036 | ***1,036*** | 1,073 | **NA** |
| Management of companies and enterprises 1/ | ***1,213*** | ***722*** | ***1,121*** | ***NA*** |
| Administrative and waste services 1/ | ***284*** | ***1,047*** | 1,700 | 1,772 |
| Health care and social assistance | 3,216 | 3,777 | 3,998 | 3,947 |
| Arts, entertainment, and recreation | | | | 667 |
| Accommodation and food services | 2,508 | 2,448 | 2,744 | 2,668 |
| Other services, except public administration | 1,812 | 1,917 | 2,072 | 2,035 |
| Government and government enterprises | 5,547 | 5,561 | 5,451 | 5,469 |
| Federal, civilian | | | | 894 |

1/ Some REIS data is unavailable due to disclosure of confidential information. Where shown, it is estimated using IMPLAN data. These data are indicated by bold italics. NA=Not Available

Source: Most recent and available Regional Economic Information System, Bureau of Economic Analysis (BEA REIS), U.S. Department of Commerce (Table CA25 NAICS).

The poverty rate for Klamath County is higher than that of the state. Approximately 17 percent of individuals had income that was below the poverty line in 2008. The percentage in Oregon as a whole was 13.5 percent.

From 1970 to 2006, average earnings per job, adjusted for inflation, have fallen from $36,288 in 1970 to $32,470 in 2006. In 2006, average earnings per job in Klamath County, Oregon ($32,470) were lower than the state ($40,818) and the nation ($47,286).

Per capita income, adjusted for inflation, has risen from $19,812 in 1970 to $26,908 in 2006. That is lower than the state average of $33,299 and the national average of $36,714 in 2006.

In the last 36 years, non-labor sources of income grew at an annual rate of 3.6 percent, outpacing labor sources which grew at a 0.7 percent rate. In 2006, 44.0 percent of total personal income was from non-labor sources. These sources include dividends, interest, and rent as well as transfer payments from governments to individuals, such as Medicare, Social Security, unemployment, and disability insurance. In 2006, welfare represented 8.4 percent of transfer payments and 2.1 percent of total personal income. From 1970 to 2006, 72.1 percent of new income was from non-labor sources.

In 2007, the unemployment rate was 7.0 percent compared to 5.2 percent in the state and 4.6 percent in the nation. Since 1990, the unemployment rate varied from a low of 6.7 percent in 2006 to a high of 10.4 percent in 1993. Monthly unemployment rates are higher in the winter compared to the summer.

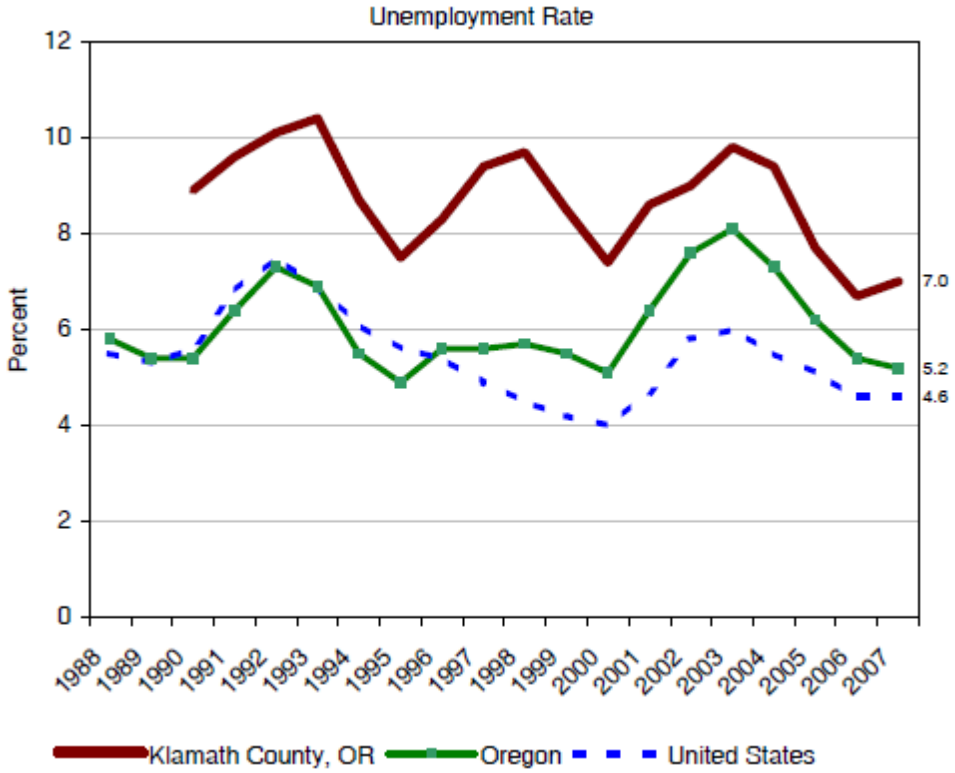


**Figure 54. Annual Average Unemployment Rate Compared to the State and the Nation**

Source: Regional Economic Information System, Bureau of Economic Analysis (BEA REIS), U.S. Department of Commerce (Table CA25 NAICS).

## Primary Uses of Forest Lands

### Timber Harvest

Oregon is the nation's leader in softwood lumber production. The forest sector is the second largest contributor to Oregon's economy behind high tech. The forest sector accounts for 6.9 percent of Oregon's total industrial output. Oregon's primary wood products (lumber, veneer and plywood), secondary wood products (doors and windows), and forestry services (firefighting, reforestation) contribute $12.6 billion annually to the state's economy. Forestry products and services employ over 85,000 people directly in Oregon and are critical to Oregon's rural communities. Annual wage income adds up to $3.5 billion. The primary forest products sector pays an average wage of $49,800 — 45 percent higher than the state's average wage of $34,400 (Oregon Forest Resources Institute, July 2010).

Timber harvesting has been a key use of forests in Klamath County. Production in the 1980s was nearly half a billion board feet per year. For example, in 1986, a total of 462 million board feet were harvested. Of that, 281 million board feet, about 61 percent, was harvested from Forest Service land. During the 1990s harvest levels declined sharply. In 2006, approximately 152 million board feet were harvested in Klamath County. Of that total, 29 million board feet, or 19 percent, was harvested from Forest Service land.

Klamath Falls has two mills that process logs. One is Thomas Lumber, which produces lumber for Jeld-Wen, a manufacturer of windows and doors; the other produces dimensional lumber. Timber cut from the Crescent and Chemult Ranger Districts is rarely or never sent to the dimensional lumber mill in Klamath Falls. The closest mill to Crescent and Chemult is Interfor Pacific in Gilchrist. Wood from the Crescent and Chemult Ranger Districts is also sent to two mills in John Day, a dimensional mill for pine in Warm Springs, and two mills in White City/Medford and Roseburg. There are some small manufacturing mills that produce windows and doors in Prineville and Redmond. There is also a small molding mill in the town of Crescent that employs about 10 people. It is dependent on byproduct from the local mill.

**Non-timber Forest Products**

Matsutake mushrooms are a valuable commercial special forest product that grows on the Crescent and Chemult Ranger Districts. The mushroom harvesting season runs from September to November and the harvesting community has been vocal in their concerns that disturbance to the soil or activities that open the tree canopy could reduce either matsutake habitat or productivity. However, in the Rim-Paunina area habitat for matsutake is limited and primarily within the southwest region of the District. Instead, mushroom harvesters use the 94 road to access harvest areas within the neighboring Fremont-Winema Forests (T. Kerr, per. comm. 2010). For more information on habitat, reference the Botany section of this chapter.

Local businesses enjoy a ‘mini boom’ with the influx of up to 1,000 harvesters for the two month harvest season, purchases of miscellaneous consumables and fuel increases. The local community at Crescent Lake Junction also has the opportunity to rent ‘buying station’ spots to the commercial buyers for the duration of the harvest season.

**Recreation**

Recreation, including fishing, hunting, and hiking, adds to the appeal of the area and its economy. Crater Lake National Park, which has approximately half a million visitors a year, contributes to the local economy.

Hunting plays a big part in the local economy, based on figures from Oregon Department of Fish and Wildlife and Travel Oregon, contracted with Dean Runyan and Associates. In 2008, an economic analysis by county of Fishing, Hunting, Wildlife Viewing, and Shellfishing Recreation in Oregon (“2008 Trip Characteristics and Expenditure Estimates”) was conducted. Survey results are showed in Table 119.

**Table 119. Amounts Spent by Hunting and Wildlife Viewing in Deschutes, Klamath, and Lake Counties**

| County | Hunting | Wildlife Viewing |
|---|---|---|
| Deschutes | $8,480,000 | $44,291,000 |
| Klamath | $4,214,000 | $14,931,000 |
| Lake | $2,773,000 | $ 4,940,000 |
| Total | $15,467,000 | $64,162,000 |
| State Total Percent | 11.4% | 13% |
| State Total | $136,042,000 | $495,260,000 |

Courtesy of ODFW and Dean Runyan and Associates 2008

In Klamath County, hunting for deer on Walker Rim, both bow and arrow and rifle (eight weeks total), brings a potential economic boost every fall, not only from the hunting license fees but food, gas and other amenities. There are eight campsites at Boundary Springs (a primitive designated camping area) and 13 other dispersed sites along major green dot roads up along the Walker Rim, and each campsite usually averages two ATVs. The cost of gas to the vehicle to haul the ATVs and other hunting gear, plus usually a camper or RV for the hunters to sleep in means local gas stations and small stores benefit. Local motels in Gilchrist, Crescent, and Crescent Lake Junction also see an increase in use during the fall hunting season.

**Direct and Indirect Effects of the Alternatives**

Proposed management scenarios assume that society's interests in public forests are best served by maintaining stand structure and biological diversity as well as by even flows of forest products through time. This analysis deals with many variables in the economy, in project design and implementation, and in the social responses of diverse publics. The analysis strives to estimate the effects as accurately as possible using the best available data, making reasoned assumptions and focusing on key components. The issue of absolute accuracy does not affect the utility of this analysis since the alternatives are all developed, analyzed, and compared in the same manner.

The following section includes discussions of both social and economic impacts as well as economic efficiency. Both impact analysis and efficiency analysis are important to trade-off assessment. Impact analysis addresses the distribution of costs and benefits. It identifies who gets how much of what and who pays the cost. This includes the distribution of jobs and income resulting from goods and services produced by each alternative, impacts to businesses, and changes to social variables. These distributional costs and benefits can be described in monetary, or other quantitative and qualitative measures.

Efficiency is about the cost of producing or doing something and comparing that cost to the resulting change in values. Typical measures include benefit cost ratios and net present value. Such measures are useful to determine if timber sale projects are below or above cost. Not all efficiency measures can or need to be expressed monetarily. Other quantitative and qualitative measures are also useful.

**Social and Economic Effects**

The social and economic effects are evaluated using several indicators, including harvest volume, jobs, income, and physical and social environmental health (e.g. environmental justice).

The purpose and need for this project includes contributions to local and regional economies by providing timber and other wood fiber products. Alternative D produces the most timber volume at approximately 25.3 million board feet. Alternative C produces the least at 15.3. The assumptions are that one half of the volume is in ponderosa pine; 80 percent are likely to be saw logs suitable for processing at a mill. The next species is lodgepole (35 percent) with fir (15 percent) comprising the remaining volume.

Timber industry response coefficients and timber related job estimates were produced using state-wide estimates based on log consumption by industry, employment, and labor income for 1998 (Gebert et al. 1998) and conversation with Mike Cloughesy (July 2010) with the Oregon Forest Resources Institute. The project area and closest mill (Interfor Pacific LTD in Gilchrist) is situated in Klamath County; however, potential bidders could be from any county east or west of the Cascade Mountains. Therefore, a statewide perspective was used to determine the potential economic effect of the project on jobs. In 2007, the Oregon Employment Department attributed 63,539 jobs to the forestry sector with 3.79 billion board feet produced[39]. A comparison of jobs created by the Rim-Paunina project area by million board feet can

[39] http://www.oregonforests.org/FactsAndResources/Publications.html

be extrapolated using a coefficient of 17 jobs per million board feet. This is for comparison only. The following Table 120 displays potential jobs created by the Rim-Paunina project.

**Table 120. Potential Jobs in the Timber Industry per Million Board Feet Created by Rim-Paunina Project**

| Timber Industry Response Coefficients ** | Alt B | | Alt C | | Alt D | | Alt E | |
|---|---|---|---|---|---|---|---|---|
| Jobs/MMBF | Volume | Jobs | Volume | Jobs | Volume | Jobs | Volume | Jobs |
| 17 | 19.9 | 338 | 15.3 | 260 | 25.3 | 430 | 24.1 | 410 |

** a coefficient of 17 jobs per million board feet

**Table 121. Cash Flow Analysis by Alternative**

| | Alt A | Alt B | Alt C | Alt D | Alt E |
|---|---|---|---|---|---|
| **Volume (Million Board Feet)** | 0 | 19.9 | 15.3 | 25.3 | 24.1 |
| **Total benefits** | | $3,993,536 | $3,329,174 | $5,504,095 | $5,243,907 |
| **Total costs**[40] | | $4,176,144 | $4,285,937 | $4,898,799 | $4,833,813 |
| **Net Potential Value** | | -$233,401 | -$872,727 | $408,603 | $202,095 |
| **Benefit Cost Ratio**[41] | | **0.94** | **0.77** | **1.10** | **1.05** |

***Biomass and Small Diameter Utilization***

Approximately 20 percent of the volume in ponderosa pine and 40 percent in lodgepole pine is attributable to "other" products such as biomass, chips, post and poles, and firewood. There are few local markets for fiber beyond JTS animal bedding material in Redmond, therefore, most chips are either processed in LaPine and go on to secondary markets, or are trucked directly to Roseburg, Oregon or White City, Idaho. It is likely a local biomass plant in Klamath Falls would be nearly on line by the time Rim-Paunina project is implemented.

The Crescent Ranger District is one of the largest suppliers of post and pole material in the State of Oregon (personal conversation with Phil Chang, Central Oregon Intergovernmental Council, 2010). The Rim-Paunina area is expected to go a long way in filling the demand created by the local post and pole mill and others suppliers.

***Big Game and Hunting***

The big game hunting opportunities on Walker Rim and available habitat is relatively small compared to the much larger Ft. Rock Unit which overlaps the Fremont-Winema Forest and BLM lands. As a result of the implementation of both the Rim-Paunina project and the Three Trails OHV project, there would be no loss of hunting acreage or motorized access within National Forest System lands in the analysis area. However, the proportion of the hunting public that prefers a less motorized landscape and a higher quality hunting experience would likely have a decreasing degree of satisfaction. Conversely, those hunters seeking areas with a high degree of motorized use would continue to benefit from a general lack of regulated access. Legal and illegal harvest of deer and elk would be expected to continue at the same rate or slightly increase as more user-created motorized routes are established, though this would also be

[40] Total costs include planning, required mitigation, and essential and non-essential sale improvement projects such as prescribed burning, disposal of slash, and restoration activities such as small diameter thinning and prescribed burning.

[41] A benefit cost ratio is the discounted benefits divide by the discounted costs. A benefit cost ratio less than one (1) indicates a below cost sale.

subject to other factors negatively affecting big game populations. For more disclosure on the cumulative effects on big game, reference the Wildlife-Big Game discussion from this chapter.

Project Design Features (Chapter 2) have been developed to maintain the character and experience for dispersed camping by minimizing change to the setting. The largest trees onsite would be retained with landings, skid trails, and soil decompaction activities located away from camping areas. Also, during rifle hunting season, all harvest activities would honor agreements with the green dot system and access management for motorized vehicles.

# Air Quality

The 1970 Federal Clean Air Act, as amended in 1977 and 1990 (42 U.S.C. §7401 et seq.), is a legal mandate designed to protect human health and welfare. National Ambient Air Quality Standards are defined in the Clean Air Act as levels of "criteria" pollutants above which may result in detrimental effects on human health and welfare. These criteria pollutants include carbon monoxide, lead, nitrogen oxides, particulate matter ($PM_{2.5}$ and $PM_{10}$), ozone, and sulfur dioxide.

State Implementation Plans (SIPs) are adopted by each state to implement the provisions of the Clean Air Act. State Implementation Plans describe the state's actions to achieve and maintain National Ambient Air Quality Standards. If an area consistently does not meet or "attain" the National Ambient Air Quality Standards, it is designated as a non-attainment area and must demonstrate to the public and the Environmental Protection Agency (EPA) how it would meet standards in the future. The Oregon Department of Environmental Quality regulates and monitors air quality for the State.

Section 160 of the Federal Clean Air Act also requires measures to "preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, scenic, or historic value." Class I airsheds include Forest Service and Fish and Wildlife Service Wilderness areas over 5,000 acres that were in existence before August 1977, and National Parks in excess of 6,000 acres as of August 1977. Designation of Class I airsheds allows only very small increments of new pollution above existing air pollution levels, Class I airsheds have the highest air quality protection standards, in part, because visibility was identified as an important value while Class II airsheds have a moderate level of protection. Airsheds within the Rim-Paunina project area are described below.

**Affected Environment**
Smoke produced from wildland or prescribed fires potentially can affect urban landscapes. Approximately 75,000 people live in the surrounding communities. Many of the residents in the area live in the large city of Bend, or small towns such as Sunriver, La Pine, Crescent, Gilchrist, and Crescent Lake Junction; however, a significant percentage of the populations live in the wildland/urban interface in the countryside surrounding these cities and towns.

**Class 1 Airshed**
Class I airsheds are protected by the Prevention of Significant Deterioration (PSD) program and include national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value. Diamond Peak Wilderness and Mount Thielsen Wilderness are Class I airsheds (OAR 340-204-0050). They are also considered a "smoke sensitive area." Mt. Thielsen Wilderness is approximately one mile to the west of the project area. Diamond Peak Wilderness is approximately thirteen miles to the northwest of the project area (Figure 55).

**Class 2 Airshed**
Class II areas are attainment areas that are neither industrialized nor meet the specific requirements for classification as Class I areas. They are protected by the PSD program. The Rim-Paunina planning area is a Class 2 airshed.

**Designated Area**
Those areas identified as principal population centers or other areas of requiring protection under state or federal air quality laws or regulations. The Rim-Paunina Project area is located approximately 50 miles southwest of Bend, Oregon. Bend is classified as a "Designated Area" by the Oregon Smoke Management Report.

To date, the urban and industrial centers adjacent to the Deschutes National Forest are attaining National Ambient Air Quality Standards (OAR 340-204-0030 and OAR 340-204-0040). Sources of local criteria air pollution on the Deschutes National Forest, include (but are not limited to) construction equipment, vehicles (off-highway and highway legal), wildfires, and forest management activities (i.e., prescribed fires, wildland fire use, pile burning).

**Direct and Indirect Effects**
**Alternative A**
Although this alternative would not have any activity-generated smoke emissions, it carries the highest likelihood for a wildfire with a "Problem Fire' scenario. Table 122 to Table 126 illustrates that emissions and subsequent effect to air quality from a wildfire such as the recent Davis Fire are far greater than through management actions prescribed in Alternatives B through E.

**Alternatives B, C, D, E, and Wildfire**
Prescribed burning operations associated with all action alternatives would incorporate Project Design Features (listed in Chapter 2) intended to minimize effects to air quality. Potential effects to human health are displayed in the section titled "Public Health and Safety" in Chapter 3.

The First Order Fire Effects Model (FOFEM) is a computer program developed to predict and plan for fire effects. Development of FOFEM involved a search for fire effects literature for predictive algorithms. These algorithms were screened to evaluate their predictions over a range of conditions. Thus, a major internal component of FOFEM is a decision key that selects the best available algorithm for the conditions specified by a user.

Analysis of the Rim-Paunina alternatives used FOFEM to generate Table 122 to Table 126 which summarize fuel consumption and smoke emission information. Alternative A was modeled under a problem fire scenario. Alternatives B, C, D, and E include emissions from planned pile disposal and prescribed underburning. These estimates are conservative for the action alternatives because the market demand for biomass could utilize piles instead of burning for disposal. This would lower the emissions and carbon output.

The prevailing winds are out of the southwest and normally would push the smoke east away from the Wilderness areas (Mt Thielsen and Diamond Peak) and from population centers like Bend.

**Cumulative Effects**
The Forest Service voluntarily follows the State of Oregon Smoke Management Plan. This plan regulates cumulative smoke outputs daily in airsheds regardless of ownership and uses existing and predicted weather forecasts. Any burning adjacent to or with the potential to affect the smoke produced by prescribed burning in the Rim-Paunina area would be regulated in this manner. Burn days and emissions are assigned on a cumulative basis.

**Table 122. Potential Emissions for a "Problem Fire" Scenario**

| Emissions | Pounds per Acre |
|---|---|
| PM10 | 413 |
| PM2.5 | 350 |
| CH4 | 204 |
| CO | 4,371 |
| CO2 | 35,976 |
| NOX | 33 |
| SO2 | 24 |
| **Total Tons Emission** | **880,809** |

**Table 123. Alternative B Prescribed Fire Emissions (12, 036 acres)**[42]

| Emissions | Pounds per Acre | Total /Tons |
|---|---|---|
| PM10 | 174 | 1047 |
| PM 2.5 | 148 | 891 |
| CH4 | 85 | 443 |
| CO | 1,793 | 9,527 |
| CO2 | 17,138 | 103,136 |
| NOX | 19 | 114 |
| SO2 | 12 | 72 |
| **Total Tons Emission** | | **125,200** |

**Table 124. Alternative C Prescribed Fire Emissions (14,751 acres)**

| Emissions | Pounds per Acre | Total /Tons |
|---|---|---|
| PM10 | 174 | 678 |
| PM 2.5 | 148 | 1283 |
| CH4 | 85 | 627 |
| CO | 1793 | 13,224 |
| CO2 | 17,138 | 126,401 |
| NOX | 19 | 140 |
| SO2 | 12 | 89 |
| **Total Tons Emission** | | **141,764** |

**Table 125. Alternative D Prescribed Fire Emissions (14,751 acres)**

| Emissions | Pounds per Acre | Total /Tons |
|---|---|---|
| PM10 | 174 | 678 |
| PM 2.5 | 148 | 1,283 |
| CH4 | 85 | 627 |
| CO | 1793 | 13,224 |
| CO2 | 17,138 | 126,401 |
| NOX | 19 | 140 |
| SO2 | 12 | 89 |
| **Total Tons Emission** | | **141,764** |

[42] **PM10**: Particulate Matter that is 10 micrometers or smaller in size; **PM2.5**: Particulate Matter that is 2.5 micrometers or smaller in size; **CH4**: Methane; **CO**: Carbon Monoxide; **CO2**: Carbon Dioxide; **NOX**: Nitrogen Oxide; **SO2**: Sulphur Dioxide.

**Table 126. Alternative E Prescribed Fire Emissions (16,193 acres)**

| Emissions | Pounds per Acre | Total /Tons |
|---|---|---|
| PM10 | 174 | 1,409 |
| PM 2.5 | 148 | 1,198 |
| CH4 | 85 | 688 |
| CO | 1793 | 14,517 |
| CO2 | 17,138 | 138,612 |
| NOX | 19 | 154 |
| SO2 | 12 | 97 |
| **Total Tons Emission** | | **156,672** |

# Wilderness, Potential Wilderness Areas, Inventoried Roadless Areas, and Other Undeveloped Lands

## Introduction

This section of the EIS discloses the affected environment and environmental consequences for wilderness areas, potential wilderness areas (PWAs), Inventories Roadless Areas (IRAs) and other unroaded or undeveloped lands.[43] Appendix D of this Environmental Impact Statement discloses additional narrative and maps in support of these analyses for the potential wilderness inventory analysis.

The area for each of these analyses is the approximately 40,000 acre Rim-Paunina project area, where over the past several decades fire exclusion has altered natural ecological processes. Suppression of fire in these areas has helped create the stand composition and structure that is now present. In the dry upland forest, stands once dominated by open park-like stands of ponderosa pine have closed in with shade tolerant species such as Douglas-fir and grand fir. The amount of this situation across this landscape is uncharacteristic (un-natural) and unwanted. The Rim-Paunina project proposes to affect a change in these conditions through vegetative treatments and prescribed burning.

The vast majority of the area, especially on lands less than 30 percent slope, has been managed in the past. This area has been harvested and roaded except on the steeper slopes of Walker Rim and in land allocations such as Wilderness and Oregon Cascades Recreation Area (OCRA).

## *Wilderness*

### Affected Environment

A wilderness area is designated by congressional action under the Wilderness Act of 1964 and other wilderness acts. Wilderness is undeveloped Federal land retaining primeval character and influence without permanent improvements or human habitation (Deschutes Forest Plan, page G-16). The Mt. Thielsen Wilderness was designated by Congress through the Oregon Wilderness Act of 1984 (Public law 98-328). Approximately 6,400 acres of the 55,100 acre wilderness are located on the Deschutes National Forest. The rest of the wilderness is located on the Fremont-Winema and Umpqua National Forests (Deschutes Forest Plan, Appendix 4).

### Environmental Consequences – All Alternatives

There are no designated wilderness areas within, nor directly adjacent to the project planning area. The closest designated wilderness is the Mt. Thielsen Wilderness approximately one mile to the west. Diamond Peak Wilderness is approximately 13 miles to the northwest of the planning area (Figure 55).

The Rim-Paunina project activities would have no effect on the wilderness character, including solitude, on either wilderness because of the distance to the nearest treatment unit (approximately one mile). No activities would occur adjacent or within any designated wilderness.

[43] The term ‘other undeveloped lands’ is presented and used in this document to provide a consideration for lands that do not contain roads and evidence of timber harvest.

## *Oregon Cascades Recreation Area*

**Affected Environment**
The Oregon Cascades Recreation Area (OCRA) was established as part of the Oregon Wilderness Act of 1984 (Public Law 98-328), extends along the crest of the Cascade Mountain Range from the Diamond Peak Wilderness to within ¼ mile of the northern boundary of Crater Lake National Park on the Umpqua National Forest. The designated area encompasses 157,000 acres on three National Forests: the Deschutes, Umpqua, and Willamette. It is an area exhibiting rich diversity in landform and wildlife, and also provides a variety of recreational experiences (Deschutes Land and Resource Management Plan, Appendix 4 p. 4-30).

### *Environmental Consequences*
**Alternative A**
The affected environment would remain unchanged, except by natural processes. Biological and ecosystem functions would continue. The landscape would likely continue developing complex fuel loads. A wildfire may burn more extensively and kill more trees within upland forest stands which would result in larger acreages of blackened landscapes compared to prescribed fires.

**Alternative B**
The Rim-Paunina project is adjacent to the boundary of the OCRA however no activities are planned in the OCRA. Alternatives B has units 480 (85 acres), 475 (167 acres) and 490 (266 acres) that are adjacent to the east and south sides of the OCRA boundary. Thinning (harvest improvement cuts) in these three units is designed to remove the less desirable trees and improve stand composition and quality would potentially reduce wildfire intensity as well as crown fire potential outside the OCRA. Prescribed underburning following thinning would reduce slash and fuel loading on the ground contributing to a more natural fuel break further reducing a wildfire from spreading into the OCRA. Prescribed burning would create smoke for several days that may be seen or smelled by people recreating in the OCRA adjacent to the boundary. Unit 490 is separated from the OCRA by Forest Service road 5840 and all harvest activities would utilize this road for hauling. Unit 480 would utilize the existing 420 road which is adjacent to the OCRA boundary and Unit 475 would utilize a short section of temporary road extending southwest from the 5835-600 to haul east to Forest Service road 5835 (see Figure 53). None of these activities would occur within the Oregon Cascades Recreation Area and all activities adjacent to the OCRA are on existing roads therefore there would be no effects to the vegetation characteristics within the OCRA.

**Alternatives C and D**
Alternatives C and D have unit 490 that is adjacent to the southwest corner of the Oregon Cascades Recreation Area. Approximately 266 acres would be thinned however no roads (temporary or permanent) would be constructed within or adjacent to the OCRA. There would be no effects from the Rim-Paunina project on the Oregon Cascades Recreation Area.

**Alternative E**
The Rim-Paunina project is adjacent to the boundary of the OCRA however no activities are planned in the OCRA. Alternative E has units 480 (85 acres) and 490 (266 acres) that are adjacent to the east and south sides of the OCRA boundary. Thinning (harvest improvement cuts) in these two units is designed to remove the less desirable trees and improve stand composition and quality thereby potentially reducing wildfire intensity as well as crown fire potential outside the OCRA. Unit 490 is separated from the OCRA by Forest Service road 5840 and all harvest activities would utilize this road for hauling. Unit 480 would utilize the existing 420 road which is adjacent to the OCRA boundary. None of these activities would occur within the Oregon Cascades Recreation Area therefore there would be no effects.

**Common to Alternatives B, C, D and E**
Alternatives B, C, D, and E have harvest units adjacent to the boundary of the Oregon Cascades Recreation Area. Machinery noise and dust associated with harvest activities would be heard by people recreating near the OCRA boundary along Forest Service road 5840 to access to the OCRA and Mt. Thielsen Wilderness however, this condition would only exist for the duration of the harvest activities.

**Cumulative Effects**
The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. The closest proposed OHV trail to the Oregon Cascade Recreation Area is over two miles away therefore there would be no effects to the OCRA.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees, therefore there are no cumulative effects.

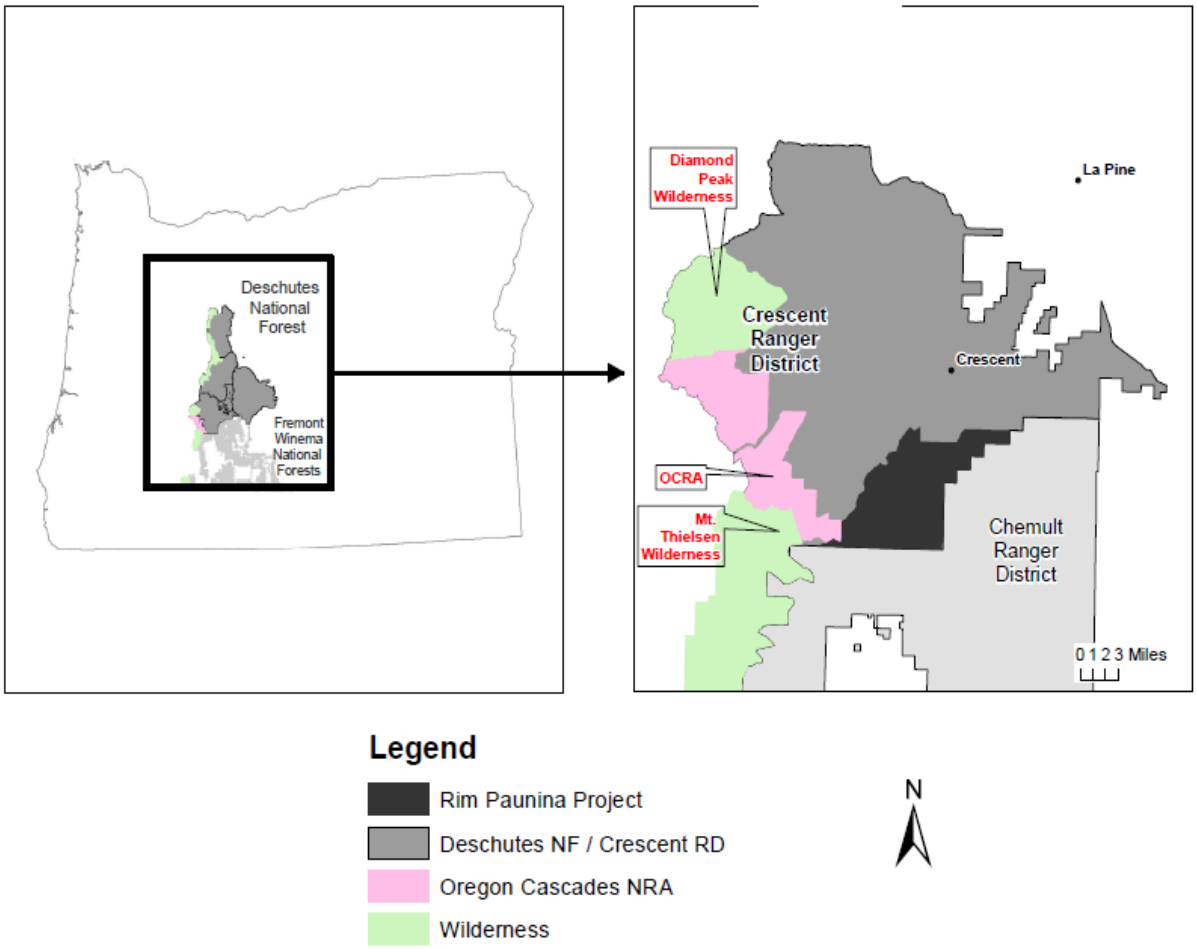


**Figure 55. Designated Wilderness, Oregon Cascades Recreation Area and their Proximity to Rim-Paunina Project Planning Area**

## *Inventoried Roadless Areas*

**Affected Environment**
Inventoried Roadless Areas (IRAs) are areas identified in the 2001 Roadless Area Conservation Rule in a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation Final Environmental Impact Statement, Volume 2, dated November 2000, which are held at the National headquarters office of the Forest Service, or any subsequent update or revision of those maps (36 CFR 294.11). These areas were set aside through administrative rulemaking and have provisions, within the context of multiple use management, for the protection of inventoried roadless areas. Most IRA boundaries are substantially identical to those identified as 'Roadless Areas', referred to in the 1982 planning rule (36 CFR 219.17) and identified by the Forest Plan and the Final Environmental Impact Statement (FEIS), Appendix C; however some localized, minor differences in boundaries may exist.

All roadless area acres were allocated to various management area strategies as disclosed in the Deschutes Forest Plan FEIS, Appendix C. Some management area strategies were intended to retain the undeveloped roadless character of the roadless area and some management area strategies were intended to develop the lands with timber harvest and road building activities; thus forgoing roadless character if these activities occurred.

**Environmental Consequences – All Alternatives**
There are no inventoried roadless areas within, nor directly adjacent to the project planning area. The closest inventoried roadless area is the Mt. Thielsen IRA approximately four miles to the southwest on the Fremont-Winema National Forests. The closest inventoried roadless area on the Deschutes is the Maiden Peak IRA approximately 15 miles to the northwest (Figure 56). Due to the distance to the nearest IRA, the Rim-Paunina project would have no direct, indirect, or cumulative effects to any inventoried roadless areas.

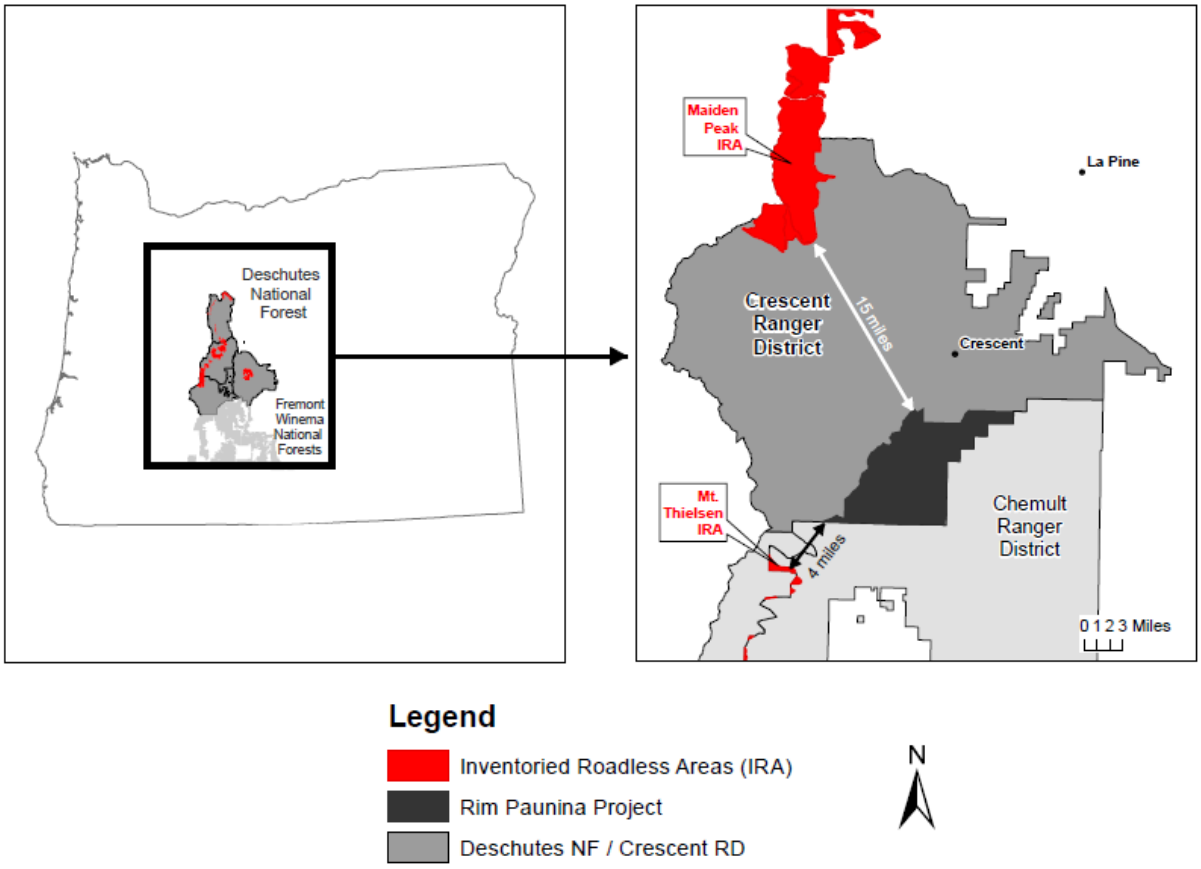


**Figure 56 Inventoried Roadless Areas and their Proximity to Rim-Paunina Project Planning Area**

## *Potential Wilderness Areas*

### Affected Environment

Potential wilderness areas are identified using inventory procedures found in Forest Service Handbook (FSH) 1909.12, Chapter 71. The inventory is conducted by the Forest Service with the purpose of identifying potential wilderness areas in the National Forest System. The National Forest System Land and Resource Management Planning Rule (currently the 1982 Rule, 36 CFR §219.17) directs that roadless areas be evaluated and considered for wilderness recommendation during the forest planning process.

Potential wilderness areas (PWAs) are not a land designation decision, they do not imply or impart any particular level of management direction or protection, they are not an evaluation of potential wilderness (Chapter 72), and lastly they are not preliminary administrative recommendations for wilderness designation (Chapter 73). The inventory of PWAs does not change the administrative boundary of any inventoried roadless area (IRA).

Typically, PWAs substantially overlap, and/or are contiguous with inventoried roadless areas. PWAs may also be contiguous with designated wilderness. Some newly inventoried PWAs may be stand alone areas that were not identified as 'roadless areas' in Appendix C of the 1990 Deschutes Forest Plan and 'inventoried roadless areas' as identified in a set of maps in the 2001 Roadless Area Conservation Rule (RACR). PWAs overlap inventoried roadless areas only where those acres of land are consistent with the inventory criteria (FSH 1909.12, Chapter 71) and may extend beyond IRA and wilderness boundaries consistent with inventory criteria.

### Methodology for Potential Wilderness Inventory for the Rim-Paunina Project

The Rim-Paunina project area and an adjacent two miles were inventoried utilizing the criteria in FSH 1909.12, Chapter 71. Areas qualify for placement on the potential wilderness inventory if they meet the statutory definition of wilderness. Areas are evaluated and are eligible for inclusion in the inventory if the area meets either criteria 1 and 3, or criteria 2 and 3 below:

1. Areas contain 5,000 acres or more.
2. Areas contain less than 5,000 acres, but can meet one or more of the following:
    a. Areas can be preserved due to physical terrain and natural conditions.
    b. Areas are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.
    c. Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.
3. Areas do not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100$^{th}$ meridian (see FSH 1909.12, section 71.12).

Additionally, the Handbook provides guidance when it is acceptable to include areas with past management actions. FSH 1909.12, section 71.11 (9) states that timber harvest areas where logging and prior road construction are not evident may be included in the inventory.

For the Rim-Paunina project area, information regarding past harvest and tree cutting operations and previous and existing road construction was gleaned from corporate databases to determine if areas were qualified to be included in the inventory using the criteria described above. Additionally, satellite imagery was utilized to determine if previously harvested areas and roads were present but not captured in the corporate databases. Geographic Information System analysis was utilized to identify areas with no previous tree cutting operations, including any roadside hazard tree removal or firewood cutting, and with no evidence of road building. The area of analysis was extended to approximately two miles beyond the Rim-Paunina project boundary to determine if larger areas meeting the inventory criteria were present adjacent to the project area.

Any polygons not containing evidence of past harvest or tree cutting operations or evidence of prior road construction were compared with the inventory criteria above and given a polygon number for ease of tracking the disposition of each polygon over one acre. Additional ground reconnaissance was also done to field verify as several parcels of land mostly to the west and north of the project area was obtained in a land exchange with Crown Pacific Limited Partnership in the late 1990's. This resulted in several polygons being removed from inventory consideration or had boundaries adjusted as there was evidence of past harvest activities. Polygons were also edited if a portion of the polygon created an isthmus or other shape that did not lend itself to being maintained as one polygon. The Fremont-Winema National Forests borders the project area on the south and east side so their timber sale polygons and roads layer were included in the analysis. Satellite imagery from the National Agriculture Imagery Program (NAIP) were utilized and overlaid with harvest unit polygons to look for evidence of stumps and roads. Once all data was reviewed and updated into the GIS analysis, a final listing of all polygons one acre or larger was

identified as not having any previous evidence of tree cutting or road construction. Each polygon was then compared against the criteria from the Handbook and a determination was made for final inclusion in the potential wilderness inventory for the Rim-Paunina project effects analysis (see Table 141 Appendix D).

**Appendix D**

Appendix D of this document describes the methodology and rationale used to inventory and identify areas eligible for inclusion in the PWA inventory within the approximately 40,000 acre Rim-Paunina project planning area. Maps included in Appendix D show a visual progression of the inventory process, final results, and proposed project activity, if any, that would occur in these areas. Potential wilderness areas included in this inventory are displayed in Figure 57.

The analysis resulted in five polygons identified for inclusion in the potential wilderness areas inventory. The five polygons (147, 219, 237, 405, and 444) are displayed in Table 127 below and Figure 57.

**Table 127. Polygons meeting FSH 1909.12, Chapter 71 for Inclusion in Potential Wilderness Inventory**

| Polygon ID | PWA acres |
|---|---|
| 147 | 328 |
| 219 | 1,145 |
| 237 | 2,545 |
| 405 | 1,636 |
| 444 | 364 |
| Total | 6018 |

**Inventory**

Polygons 147, 237, and 444, containing 3,237 acres, are all outside of the Rim-Paunina Project boundary but would be included in the inventory as they are contiguous with the Mt. Thielsen Wilderness. Polygon 147 is also adjacent to the Oregon Cascades Recreation Area. As there are no projects or activities planned within these three polygons, there would be no effects to these polygons and they would still be eligible for inclusion in a potential wilderness inventory in the future.

The remaining two polygons (219 and 405) are along Walker Rim in the southern part of the District. They contain 2,781 acres of which 2,148 are within the project boundary and the remaining 633 acres are on the Chemult District of the Fremont-Winema National Forests (see Figure 57).

Polygon 75 appears contiguous to the Mt. Thielsen Wilderness but is separated by Forest Service road 5840 and spurs and contained evidence of harvest activities once the Chemult timber sale polygons were included, thus it was not included in the potential wilderness area inventory.

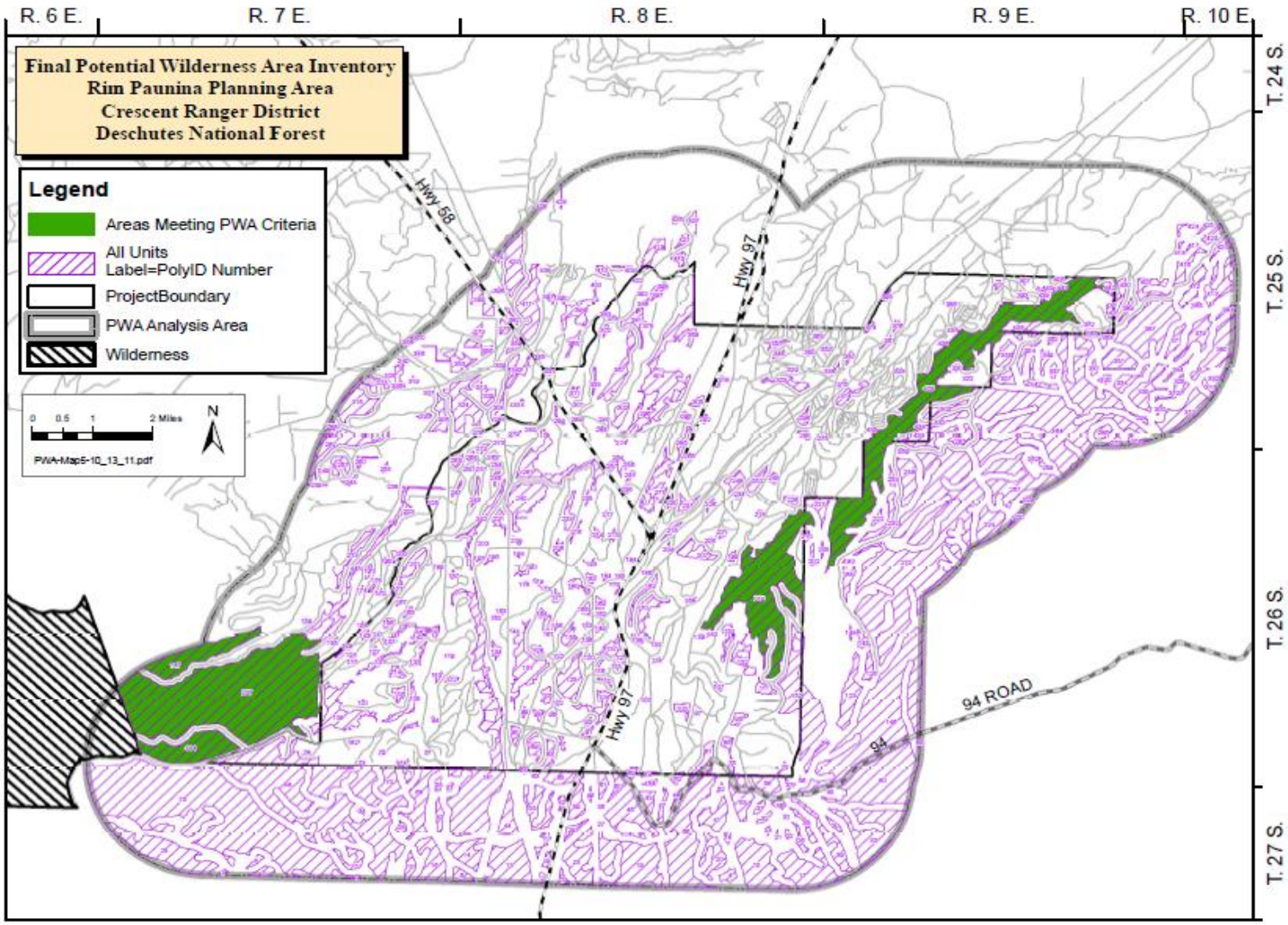


**Figure 57. Rim-Paunina Project Area with Two Mile Buffer and Five Potential Wilderness Inventory Areas**

## *Environmental Consequences*

**Alternative A- No Action**
**Direct/Indirect Effects**
There would be no direct/indirect effects to the five polygons identified as eligible for inclusion in the potential wilderness inventory because no activities would occur in the project planning area with the implementation of this alternative. The affected environment would remain unchanged, except by natural processes. Biological and ecosystem functions would continue. The landscape would likely continue developing complex fuel loads. A wildfire may burn more extensively and kill more trees within upland forest stands which would result in larger acreages of blackened landscapes compared to prescribed fires.

### *Proposed Management Actions and Effects Common to All Action Alternatives*

**Environmental Consequences – Vegetation Management**
**Direct / Indirect Effects – Alternatives B, C, D, and E**
A number of different vegetative prescriptions are proposed for the Rim-Paunina project. Harvest thinning cut (HTH) is thinning from below designed to reduce stand density and improve basal area for the remaining trees. Harvest improvement cuts (HIM) are designed to remove the less desirable trees and improve stand composition and quality. Harvest group selection (HSG) would create two to five acre openings in areas of high mistletoe infestations. Alternative Mistletoe Treatments (AltMist) would also create mistletoe-free openings, but the larger trees (over 21 inches) would be retained; however, their mortality would be accelerated by techniques such as prescribed fire or blasting. All methods reduce the tree density and would utilize prescribed underburning after harvest to varying degrees. Harvesting these areas would leave readily evident stumps, skid roads, and landings precluding the availability of these harvested areas from being included in the potential wilderness inventory after treatment. For a more thorough description of these prescriptions, refer to Chapter 2 or the Forested Vegetation section of Chapter 3. Table 128 through Table 131 describes each action alternative by harvest unit, polygon identification number, prescription, and acres that overlap the potential wilderness areas.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would built roads or harvest or cut trees. The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project, therefore there would be no additional or additive effect of road building that would remove additional acreages from the polygons eligible for inclusion in the potential wilderness inventory.

Harvest units 690 and 895 propose to utilize HTH prescription in Alternatives B and C, HSG in Alternative D and AltMist in Alternative E. All action alternatives show these two units as having less than one acre that overlaps the edges of the potential wilderness inventory area. The effects of such a small overlap would be negligible on the 2,148 acres of potential wilderness in polygons 219 and 405 and would not preclude either polygon from being added to the potential wilderness area inventory in the future after treatments.

### *Environmental Consequences – Prescribed burning*

**Direct / Indirect Effects – Alternatives C, D, and E**

Prescribed burning within the fuels only[44] areas that overlap the PWAs would change composition and structure of vegetation (EIS, Chapter 3). For a few years burned areas would display a blackened color until grasses, brush, and herbaceous species recover. Dead trees, particularly small trees (saplings to poles), would be evident over a 5 to 10-year period. Few overstory trees are expected to be killed. Outside the burned areas, the conditions described in the affected environment for both PWAs would remain unchanged except by natural processes and ongoing management activities such as hunting.

Prescribed burning would require the construction of handline which would include the cutting of some small diameter trees, snags that pose a hazard to workers, and the limbing-up (pruning) of other trees incidental to prescribed burning activities. This could cumulatively change density, composition, and structure of vegetation on approximately 744 acres in PWA polygons 219 and 405 for fuels only treatment units for Alternatives C, D, and E. Trees cut during handline construction would not be removed from the site. The sight of some random tree stumps left after handline construction incidental to prescribed burning activities could affect the natural appearing landscape and affect the ability of these acres along the fireline where tree cutting occurred to be included in a future potential wilderness area inventory along the fireline. The majority of the acreages in the polygons would still be eligible for inclusion in a future potential wilderness inventory.

### *Proposed Management Actions and Effects by Alternative*

**Alternative B- Direct and Indirect Effects**

Alternative B has eight harvest units with a total of 100 acres that overlap the 2,148 acres of potential wilderness in polygons 219 and 405. Of the eight units, four have an acre or less of overlap, thus effects would be so small they would not be measureable. The four larger units (975, 610, 710 and 740; total 99 acres) are scheduled for harvest activities. Harvest activities would remove these 99 acres from consideration from a future potential wilderness inventory but their combined total is less than five percent of the total 2,148 acres, would result in a more solid unfragmented core, and would not preclude the majority of acreage in polygons 219 and 405 from being included in a potential wilderness area inventory in the future.

Alternative B has no ‘fuels only’ acres that would overlap the potential wilderness area polygons and would not change the characteristics (such as no roads, no evidence of harvest activities) of the potential wilderness areas polygons 219 and 405, thus all acres outside the harvested areas identified above would still be available for consideration in a future inventory of potential wilderness (FSH 1909.12, Chapter 71).

[44] Fuels only treatment is a noncommercial activity designed to use fire to reduce fuel loading in areas over 30 percent slope and/or areas along the Walker Rim steeper slopes where machinery is not desired to help facilitate the return of frequent fire regimes.

**Table 128. Alternative B Acres that Overlap Potential Wilderness Areas**

| ALT | Polygon ID | Harvest Unit ID | Prescription | Acres that Overlap PWA |
|---|---|---|---|---|
| B | 219 | 895 | HTH | 0 |
| B | 219 | 975 | HTH | 31 |
| B | 405 | 610 | HIM | 7 |
| B | 405 | 630 | HTH | 0 |
| B | 405 | 650 | HTH | 1 |
| B | 405 | 690 | HTH | 0 |
| B | 405 | 710 | HIM | 55 |
| B | 405 | 740 | HIM | 6 |
| | | | **Total Acres:** | **100** |

**Cumulative Effects**

The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project, therefore there would be no additional or additive effect of road building that would remove additional acreages from the polygons eligible for inclusion in the potential wilderness inventory.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees.

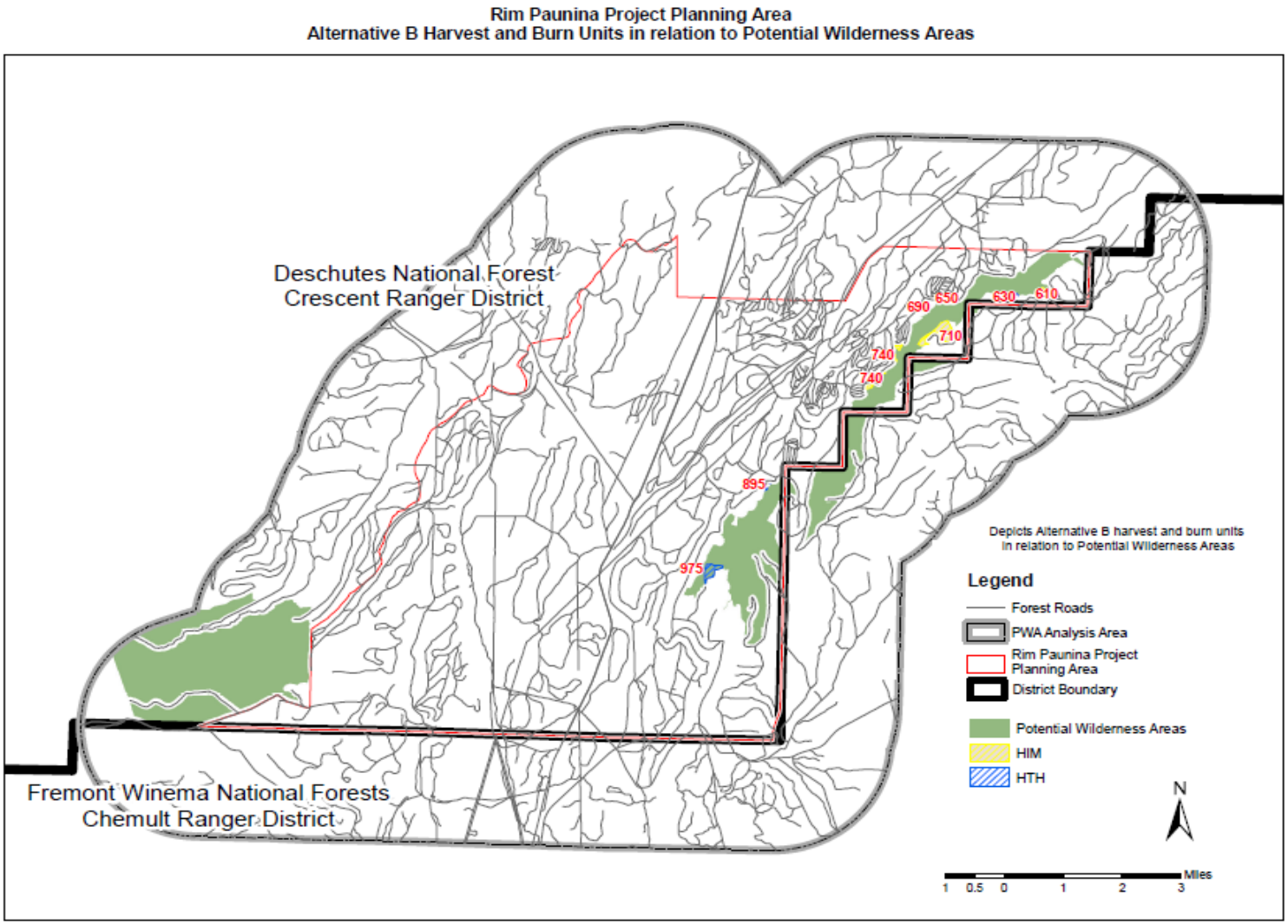


**Figure 58. Alternative B Harvest and Fuels Only Units that Overlap Potential Wilderness Inventory Areas in Rim-Paunina Planning Area**

**Alternative C – Direct / Indirect Effects**
Alternative C has five harvest units (895, 610, 650, 690, and 710) with a total of 63 acres that overlap the 2,148 acres of potential wilderness in polygons 219 and 405. Of the five units, three have an acre or less of overlap, thus effects would be so small they would not be measureable. The two larger units (62 acres total) scheduled for a harvest activities are finger extensions surrounded on three sides by roads. Harvest activities would remove these 62 acres from consideration from a future potential wilderness inventory but their combined total is less than three percent of the total 2,148 acres, would result in a more solid unfragmented core, and would not preclude the majority of acreage in polygons 219 and 405 from being included in a potential wilderness area inventory in the future.

Alternative C has 744 acres of prescribed burning units that would overlap the potential wilderness area polygons. Prescribed burning would not change the characteristics (such as no roads, no harvest activities) of the potential wilderness areas (219 and 405). Although prescribed burning could cumulatively change density, composition, and structure of vegetation on these 744 acres (due to hazard tree removal and the potential to cut some smaller diameter trees when building fireline) the effects would be minor and all acres outside of the harvest units described above would still be available for inclusion in a potential wilderness inventory in the future (FSH 1909.12, Chapter 71).

**Cumulative Effects**
The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project, therefore there would be no additional or additive effect of road building that would remove additional acreages from the polygons eligible for inclusion in the potential wilderness inventory.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees.

**Table 129. Alternative C Acres that Overlap Potential Wilderness Areas**

| ALT | Polygon ID | Harvest Unit ID | Prescription | Acres that Overlap PWA |
|---|---|---|---|---|
| C | 219 | 895 | HTH | 0 |
| C | 219 | 905 | Fuels Only | 151 |
| C | 219 | 910 | Fuels Only | 47 |
| C | 219 | 925 | Fuels Only | 25 |
| C | 219 | 930 | Fuels Only | 189 |
| C | 219 | 935 | Fuels Only | 36 |
| C | 219 | 970 | Fuels Only | 48 |
| C | 219 | 4025 | Fuels Only | 0 |
| C | 219 | 4035 | Fuels Only | 0 |
| C | 219 | 4055 | Fuels Only | 5 |
| C | 405 | 610 | HIM | 7 |
| C | 405 | 615 | Fuels Only | 172 |
| C | 405 | 625 | Fuels Only | 64 |
| C | 405 | 650 | HTH | 1 |
| C | 405 | 690 | HTH | 0 |
| C | 405 | 710 | HIM | 55 |
| C | 405 | 3000 | Fuels Only | 7 |
| | | | **Total Acres:** | **807** |

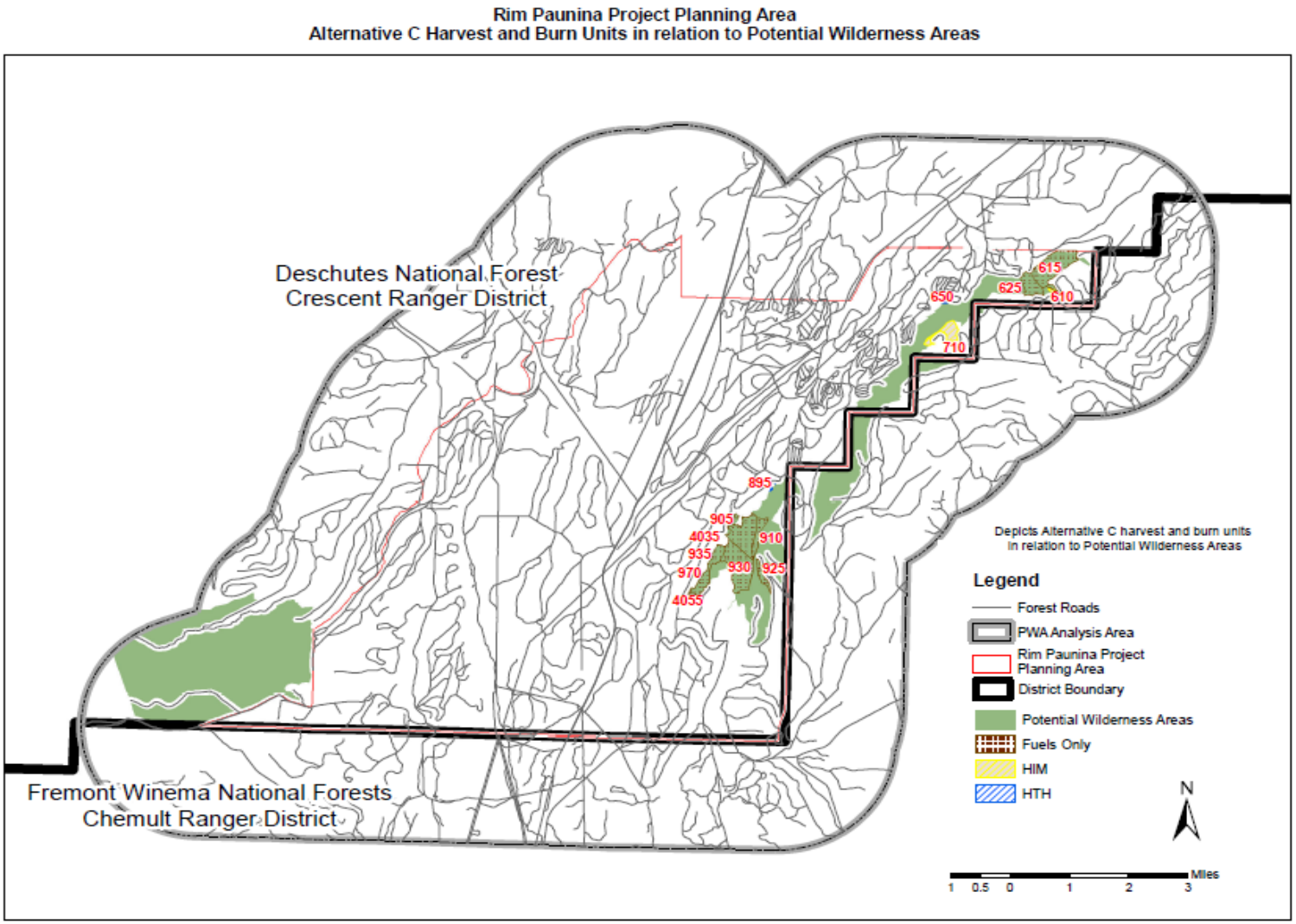


**Figure 59. Alternative C Harvest and Fuels Only Units that Overlap Potential Wilderness Inventory Areas in Rim-Paunina Planning Area**

**Alternative D – Direct / Indirect Effects**
Alternative D has five harvest units (895, 610, 650, 690 and 710) with a total of 63 acres that overlap the 2,148 acres of potential wilderness in polygons 219 and 405. Of the five units, three have an acre or less of overlap, thus effects would be so small they would not be measureable. The two larger units (62 acres total) scheduled for a harvest activities are finger extensions surrounded on three sides by roads. Harvest activities would result in stumps and skid roads that would be highly evident on the landscape and would remove these 62 acres from consideration from a future potential wilderness inventory. Their combined total is less than three percent of the total 2,148 potential wilderness inventory acres, would result in a more solid unfragmented core, and would not preclude the majority of acreage in polygons 219 and 405 from being included in a potential wilderness area inventory in the future.

Alternative D has 744 acres of prescribed burning units that would overlap the potential wilderness area polygons. Prescribed burning would not change the characteristics (such as no roads, no harvest activities) of the potential wilderness areas (219 and 405). Although prescribed burning could cumulatively change density, composition, and structure of vegetation on these 744 acres (due to hazard tree removal and the potential to cut some smaller diameter trees when building fireline) the effects would be minor and all acres outside of the harvest units described above would still be available for inclusion in a potential wilderness inventory in the future (FSH 1909.12, Chapter 71).

**Cumulative Effects**
The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project, therefore there would be no additional or additive effect of road building that would remove additional acreages from the polygons eligible for inclusion in the potential wilderness inventory.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees.

**Table 130. Alternative D Acres that Overlap Potential Wilderness Areas**

| ALT | Polygon ID | Harvest Unit ID | Prescription | Acres that Overlap PWA |
|---|---|---|---|---|
| D | 219 | 895 | HSG | 0 |
| D | 219 | 905 | Fuels Only | 151 |
| D | 219 | 910 | Fuels Only | 47 |
| D | 219 | 925 | Fuels Only | 25 |
| D | 219 | 930 | Fuels Only | 189 |
| D | 219 | 935 | Fuels Only | 36 |
| D | 219 | 970 | Fuels Only | 48 |
| D | 219 | 4025 | Fuels Only | 0 |
| D | 219 | 4035 | Fuels Only | 0 |
| D | 219 | 4055 | Fuels Only | 5 |
| D | 405 | 610 | HIM | 7 |
| D | 405 | 615 | Fuels Only | 172 |
| D | 405 | 625 | Fuels Only | 64 |
| D | 405 | 650 | HSG | 1 |
| D | 405 | 690 | HSG | 0 |
| D | 405 | 710 | HIM | 55 |
| D | 405 | 3000 | Fuels Only | 7 |
| | | | **Total Acres:** | **807** |

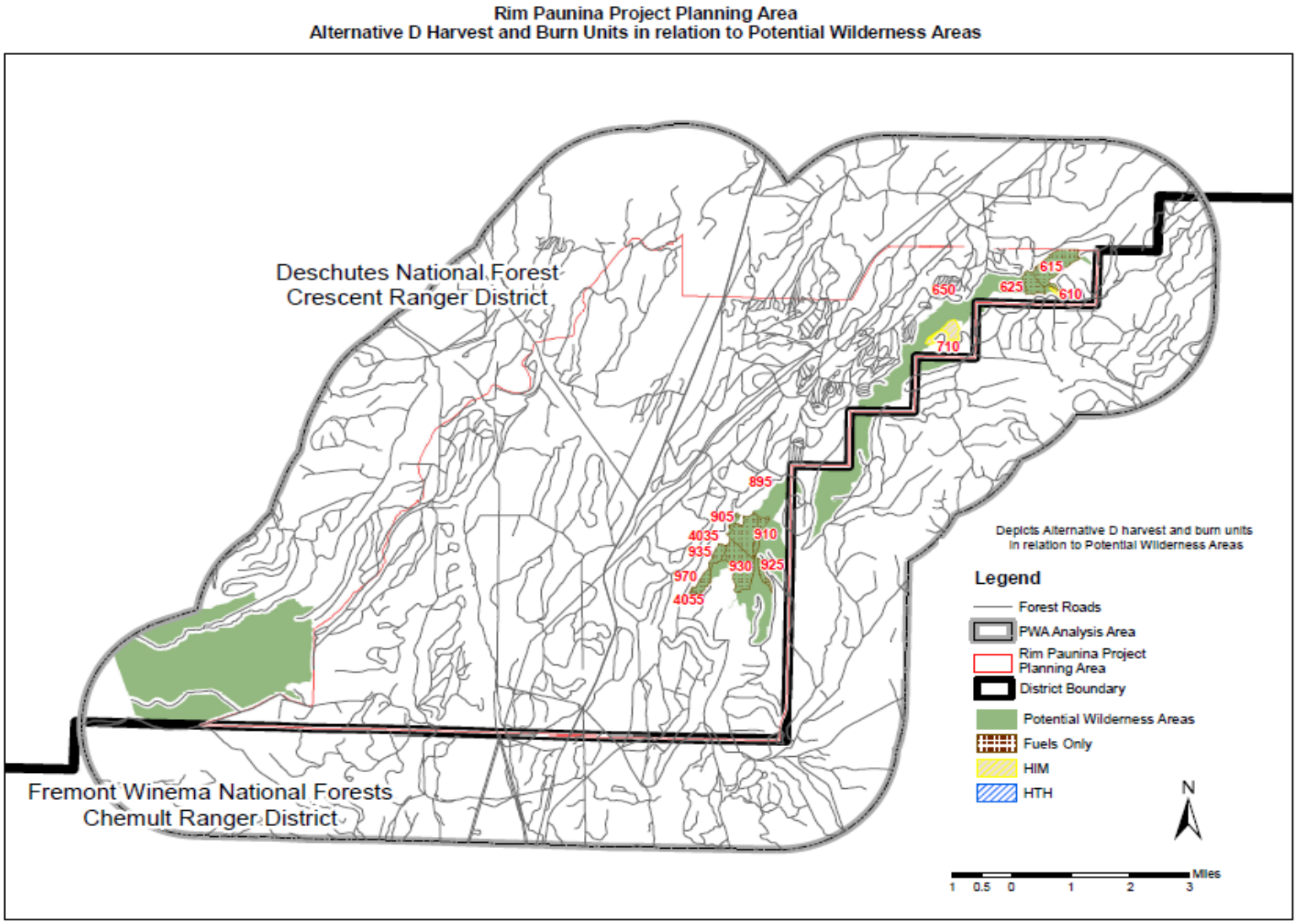


**Figure 60. Alternative D Harvest and Fuels Only Units that Overlap Potential Wilderness Inventory Areas in Rim-Paunina Planning Area**

**Alternative E**
Alternative E has eight harvest units (610, 630, 650, 690, 710, 740, 895, and 975), with a total of 100 acres that overlap the 2,148 acres of potential wilderness in polygons 219 and 405. Of the eight units, four have an acre or less of overlap, thus effects would be so small they would not be measureable. The four larger units (100 acres total) scheduled for a harvest activities are finger extensions surrounded on three sides by roads. Harvest activities would remove these 100 acres from consideration from a future potential wilderness inventory but their combined total is less than five percent of the total 2,148 acres, would result in a more solid unfragmented core, and would not preclude the majority of acreage in polygons 219 and 405 from being included in a potential wilderness area inventory in the future.

Alternative E has 744 acres of prescribed burning units that would overlap the potential wilderness area polygons. Prescribed burning would not change the characteristics (such as no roads, no harvest activities) of the potential wilderness areas (219 and 405). Although prescribed burning could cumulatively change density, composition, and structure of vegetation on these 744 acres (due to hazard tree removal and the potential to cut some smaller diameter trees when building fireline) the effects would be minor and all acres outside of the harvest units described above would still be available for inclusion in a potential wilderness inventory in the future (FSH 1909.12, Chapter 71).

**Cumulative Effects**
The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project, therefore there would be no additional or additive effect of road building that would remove additional acreages from the polygons eligible for inclusion in the potential wilderness inventory.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees.

**Table 131. Alternative E Acres that Overlap Potential Wilderness Areas**

| ALT | Polygon ID | Harvest Unit ID | Prescription | Acres that Overlap PWA |
|---|---|---|---|---|
| E | 219 | 895 | AltMist | 0 |
| E | 219 | 905 | Fuels Only | 151 |
| E | 219 | 910 | Fuels Only | 47 |
| E | 219 | 925 | Fuels Only | 25 |
| E | 219 | 930 | Fuels Only | 189 |
| E | 219 | 935 | Fuels Only | 36 |
| E | 219 | 970 | Fuels Only | 48 |
| E | 219 | 975 | HTH | 31 |
| E | 219 | 4025 | Fuels Only | 0 |
| E | 219 | 4035 | Fuels Only | 0 |
| E | 219 | 4055 | Fuels Only | 5 |
| E | 405 | 610 | HIM | 7 |
| E | 405 | 615 | Fuels Only | 172 |
| E | 405 | 625 | Fuels Only | 64 |
| E | 405 | 630 | HTH | 0 |
| E | 405 | 650 | AltMist | 1 |
| E | 405 | 690 | AltMist | 0 |
| E | 405 | 710 | HIM | 55 |
| E | 405 | 740 | HIM | 6 |
| E | 405 | 3000 | Fuels Only | 7 |
| | | | **Total Acres:** | **844** |

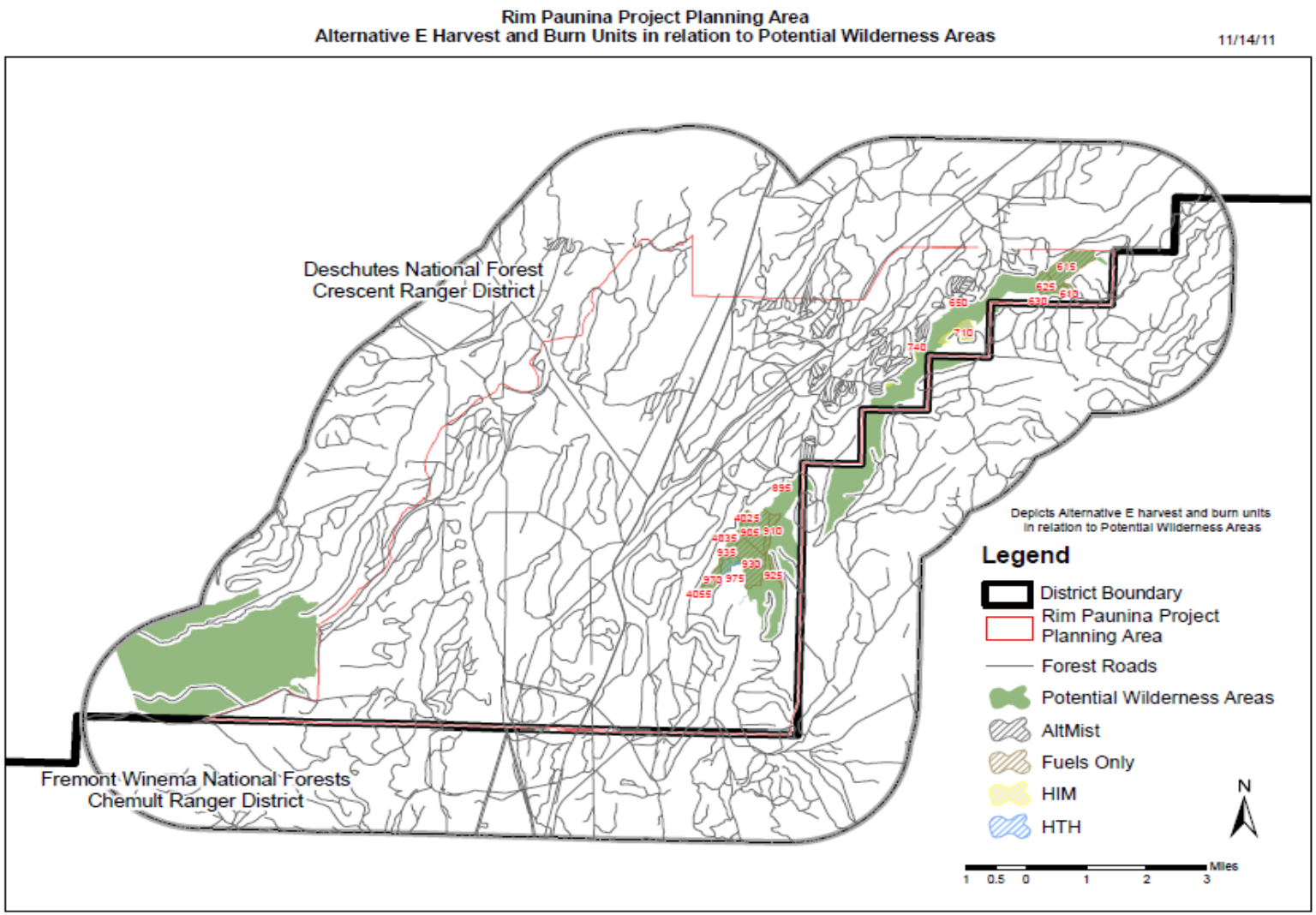


**Figure 61. Alternative E Harvest and Fuels Only Units that Overlap Potential Wilderness Inventory Areas in Rim-Paunina Planning Area**

## *Unroaded Areas or Undeveloped Lands*

These acres of land have no history of harvest activity, do not contain forest roads[45], and are not designated as a wilderness area. They are areas that are unique on the landscape, especially in the Rim-Paunina project area where larger blocks of land occur without previous management activities. These areas have values associated with them such as scenery, cultural resource values, and unfragmented habitat. These acres have no previous roads or harvest activities located in them.

The Environmental Impact Statement discloses impacts to a number of resources sensitive to the construction of new forest roads or from our system of existing roads. A road is defined and criteria and methods for inventorying a road conform to agency policy. Definitions and inventory criteria do not change project to project, Forest to Forest; they are common agency-wide.

**Background**

The Rim-Paunina Project planning area has two areas along Walker Rim that have no known harvest activities or roads. Most of this is along the steeper portions of Walker Rim (over 30 percent slope) and potential wilderness area polygons 405 and 219 overlay much of this terrain (Figure 57).

Polygon 405 (1,024 acres in the project area) is long and slender following the contour of the Rim to the north while polygon 219 (1,124 acres) is more concentrated along the southern portion of the Rim, surrounding and to the north of the Walker Mountain Electronic Site. Both unroaded areas along Walker Rim are surrounded by existing Forest Service system roads and motorized use is apparent (these two polygons are bisected by Forest Service road 9756). Opportunities for a feeling of solitude, the spirit of adventure and awareness, serenity, and self-reliance are limited by the size and shape of the unroaded areas. The modern Klamath Tribal people (currently and in the past) use these areas for religious practices. The view from Highway 97 (a scenic north/south corridor east of the Cascade crest) shows an uninterrupted ridge of older, large trees making up a desired component of scenic quality and they likely represented a greater portion of the landscape in the past. This stretch along the Rim is unfragmented core and provides habitat for goshawk, Cooper's and sharp-shinned hawks. Big Game utilize the Rim more for security and hiding cover than an actual migration corridor due to the steepness.

**Environmental Consequences**

**Alternative A**

No changes would occur to the areas identified as unroaded. Habitat conditions and areas of solitude would remain the same as the current condition. Biological and ecosystem functions would continue. The landscape would likely continue developing complex fuel loads. A wildfire may burn more extensively and kill more trees within upland forest stands which would result in larger acreages of blackened landscapes compared to prescribed fires. Cultural resources would remain the same and travelers along Highway 97 would continue to view an uninterrupted ridge of older, large trees.

**Environmental Consequences – Vegetation Management**

**Alternatives B, C, D, and E**

Harvesting would remove portions of the unroaded polygons, mostly along the edges of the core unroaded area. Units scheduled for harvest activities are finger extensions surrounded on three sides by roads. Harvest activities would remove between 62 and 100 acres of unroaded area along Walker Rim, but their combined total is less than five percent of the total 2,148 acres and would result in a more solid

[45] Forest road – A road wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources. Road – A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36CFR §212.1).

unfragmented core. Stumps and skid trails would be evident in the 62 to 100 acres where harvest would occur and evidence would likely last for 5-10 years. Cultural resources would remain unchanged with Project Design Features in place that if any new cultural sites are discovered during harvest activities they would be flagged and all operations in the area avoided until reviewed by an archaeologist, as well as buffering all know sites (Chapter 2).

Walker Rim has a scenic/visual quality objective of Partial Retention Middleground (Scenery Chapter 3). None of the harvest activities would be evident from the highway because all activities would be below the tree canopy and most of the structure seen from the highway would remain the same.

For big game harvest activities would open these stands along the edges of the core unroaded area which would increase the amount of sunlight reaching the forest floor and result in increased growth potential to forage species. This would include antelope bitterbrush and where prescribed burning would occur, an increase in native bunch grasses. This opening would also result in the loss of hiding cover for the first few years, thus mitigation measures has been included in Chapter 2 to increase the size of the 'no treatment' retention areas specifically to provide hiding cover for big game.

**Environmental Consequences – Prescribed Burning**
**Alternative B**
Alternative B has no 'fuels only' acres that would overlap the unroaded polygons and would not change the characteristics (such as no roads) of polygons 219 and 405.

**Environmental Consequences – Prescribed Burning**
**Alternatives C, D, and E**
Prescribed burning within the 'fuels only' areas that overlap the unroaded areas would change composition and structure of vegetation (EIS, Chapter 3). The "Fuels Only" prescriptions include small diameter thinning by hand and disposal of piles and prescribed fire. For a few years burned areas would display a blackened color until grasses, brush, and herbaceous species recover. Dead trees, particularly small trees (saplings to poles), would be evident over a 5 to 10-year period. Few overstory trees are expected to be killed, although some may exhibit scorching in the form of blackened bark and red needles for approximately 2-5 years after burning. Outside the burned areas, the conditions described in the affected environment for both unroaded areas would remain unchanged except by natural processes and ongoing management activities such as hunting.

Prescribed burning would require the construction of handline which would include the cutting of some small diameter trees, snags that pose a hazard to workers, and the limbing-up (pruning) of other trees incidental to prescribed burning activities. This could cumulatively change density, composition, and structure of vegetation on approximately 744 acres in unroaded polygons 219 and 405 for "Fuels Only" treatment units for Alternatives C, D, and E. Trees cut during handline construction would not be removed from the site. The sight of some random tree stumps left after handline construction incidental to prescribed burning activities could affect the natural appearing however, these would not be evident to the casual passer-by from Highway 97.

For big game the prescribed underburning would result in the reduction in tree densities that would open the forested stands resulting in increased visibility and loss of hiding cover for big game. Prescribed burning would also result in a short-term loss of forage and cover currently provided by dense patches of ceanothus and manzanita near the base of Walker Rim. The total acres of this condition are unknown although burning would likely kill most of their above ground vegetation however; immediate re-sprouting would occur providing desirable forage in the first few years after burning.

**Cumulative Effects**
**Action Alternatives**
Polygon 219 surrounds the approximately 1.9 acre designated Walker Mountain Electronic Site and its access road (DLRMP 1990 Appendix 7). The site itself and the access road were buffered and although there has been construction activity on the site it is contained within the electronic site footprint. Currently there is construction activity planned for summer 2012 and the resulting machinery noise and dust associated with construction could affect the opportunities for a feeling of solitude along portions of the Rim near the Electronic site. However, this condition would only exist for the duration of the construction activities, or approximately 60 days. No roads, harvest or cutting of trees would overlap the unroaded area. Therefore actions authorized at the electronic site would not affect the use of the unroaded areas by Tribes or any cultural elements in the unroaded area. Unfragmented habitat would not be cumulatively changed because all actions would occur within the designated electronic site.

The Three Trails OHV project (ROD Dec 2010) is a motorized trail system that overlaps the Rim-Paunina planning area. There is a portion of the trail system in the Walker area but it is on existing roads and to the south of the Walker Mountain Electronic site and there would be no direct, indirect, or cumulative effects as it is outside the unroaded polygons.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads, harvest or cut trees or otherwise change the potential unroaded characteristics in polygons 219 and 405.

## *Citizen Identified Unroaded Areas*
In the early 2000s Oregon Wild, an Oregon State interest group, conducted their own inventory across Oregon, including the Deschutes National Forest, using inventory criteria they developed for their purposes. An initial map of Oregon Wild's unroaded areas were provided in response to the scoping letter for the proposed action for the Rim-Paunina project in May 2009. In December 2011 a second contact was made to Oregon Wild to obtain their most current version of their unroaded areas (Figure 62).

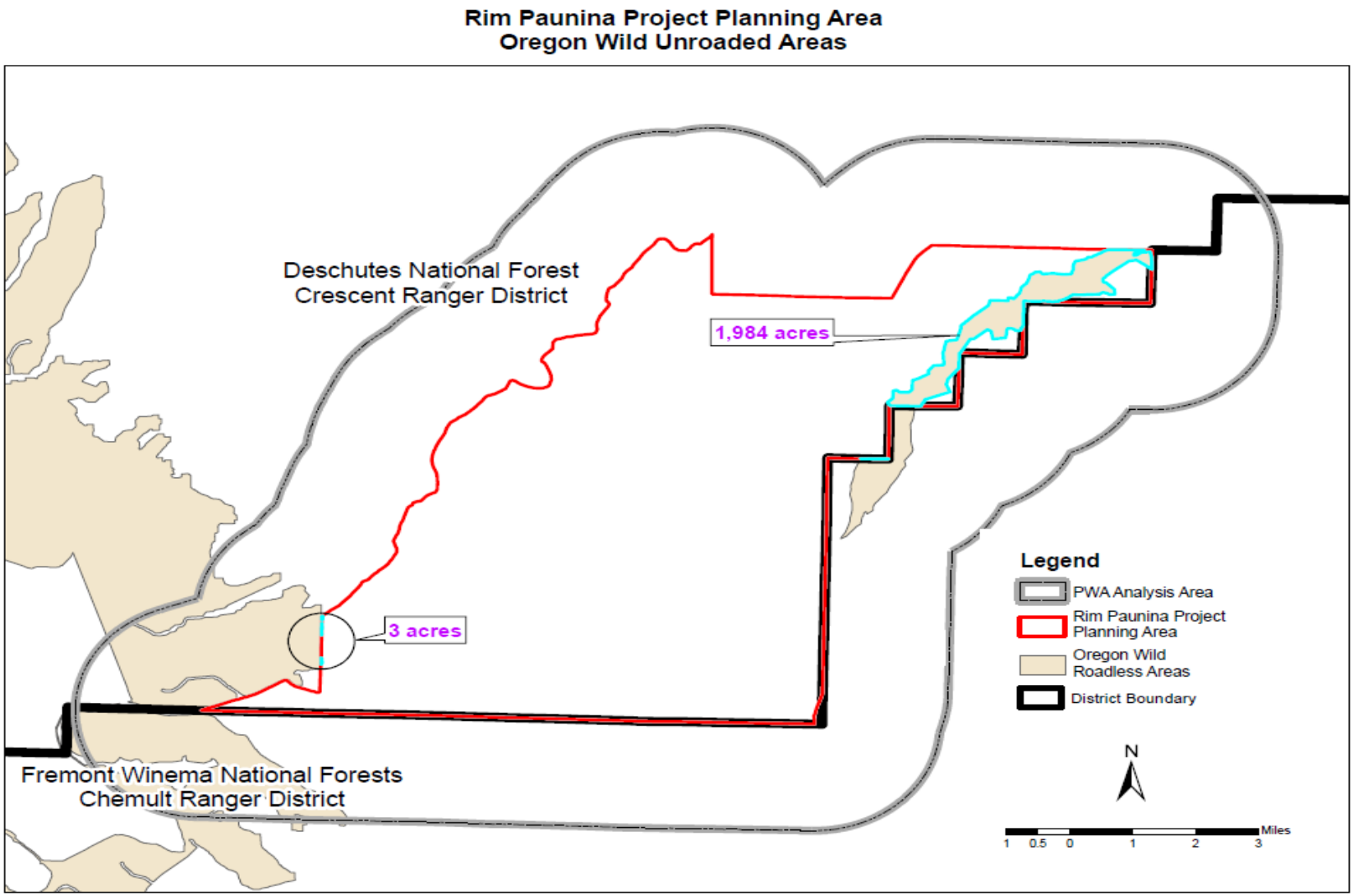


**Figure 62. Oregon Wild Unroaded Areas Overlaid on the Rim-Paunina Planning Area Including the Two-mile Buffer**

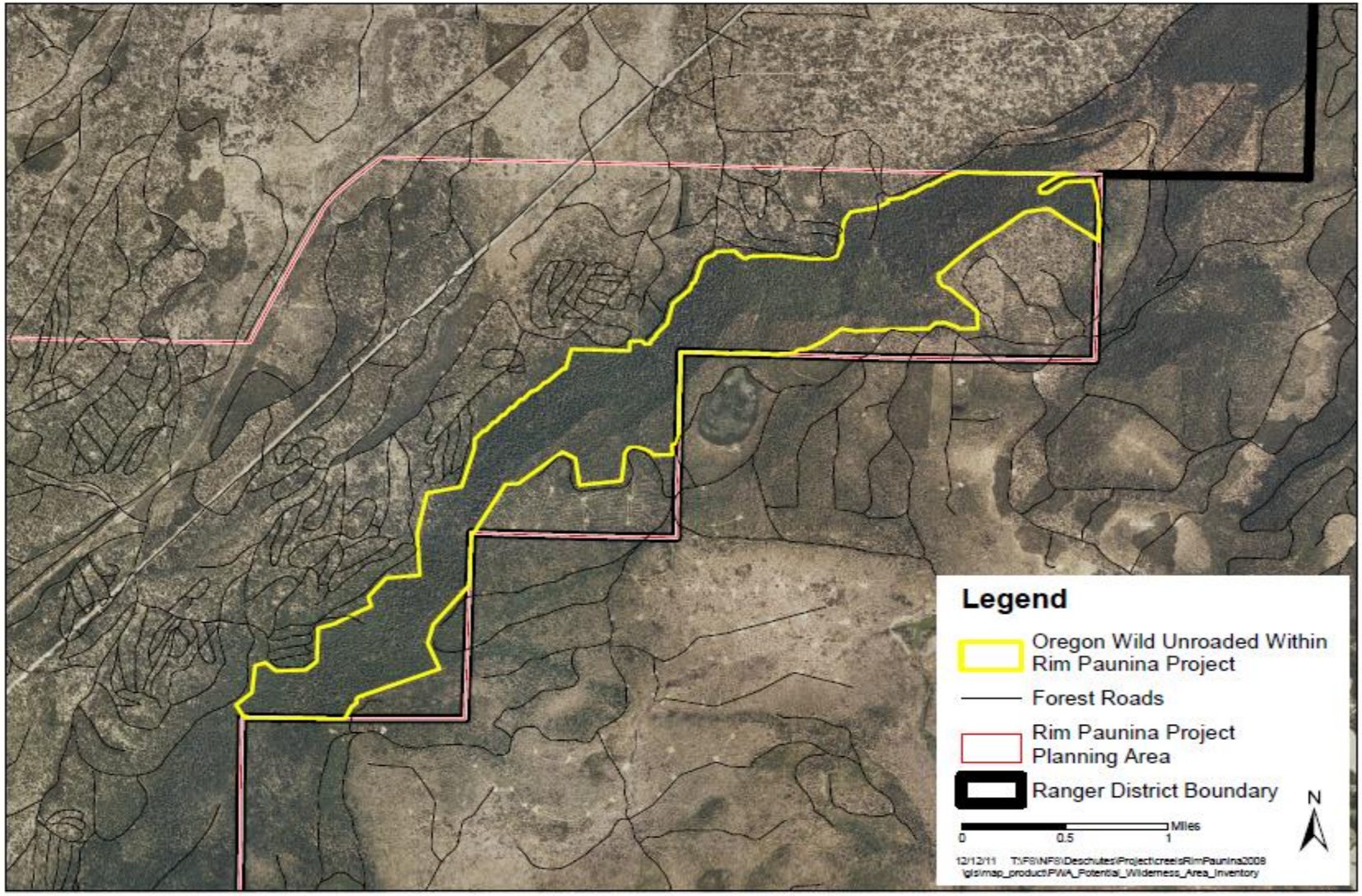


**Figure 63. Oregon Wild Unroaded Area within the Rim-Paunina Project Area along Walker Rim**

**Alternative A**
There would be no actions implemented in the Oregon Wild unroaded area with this alternative, therefore the affected environment would remain unchanged, except by natural processes. Biological and ecosystem functions would continue. The landscape would likely continue developing complex fuel loads. A wildfire may burn more extensively and kill more trees within upland forest stands which would result in larger acreages of blackened landscapes compared to prescribed fires.

### *Proposed Management Actions and Effects Common to All Action Alternatives*

**Environmental Consequences – Vegetation Management**
**Direct / Indirect Effects – Alternatives B, C, D, and E**
A number of different vegetative prescriptions are proposed for the Rim-Paunina project. Harvest thinning cut (HTH) is thinning from below designed to reduce stand density and improve basal area for the remaining trees. Harvest improvement cuts (HIM) are designed to remove the less desirable trees and improve stand composition and quality. Harvest group selection (HSG) would create two to five acre openings in areas of high mistletoe infestations in addition to thinning from below outside the openings. Alternative Mistletoe Treatments (AltMist) would also create openings but the larger trees (over 21 inches) would be retained, however their mortality would be accelerated by techniques such as prescribed fire or blasting. All methods reduce the tree density and would utilize prescribed underburning after harvest to varying degrees. Stumps would be evident for 10-30 years in the area to be harvested. Skid trails would also be evident until regeneration obliterated them in approximately 20-30 years. The created openings in HSG and AltMist would be evident on the landscape for 80 years. For a more thorough description of these prescriptions, refer to Chapter 2 or the Forested Vegetation section of Chapter 3. Table 132 through Table 134 describes each action alternative by harvest unit, prescription, and acres that overlap the Oregon Wild unroaded areas.

### *Environmental Consequences – Prescribed Burning*
**Direct / Indirect Effects – Alternatives C, D, and E**
Prescribed burning within the fuels only[46] areas that overlap Oregon Wild unroaded areas would change the composition and structure of vegetation (EIS, Chapter 3). For a few years burned areas would display a blackened color until grasses, brush, and herbaceous species recover. Dead trees, particularly small trees (saplings to poles), would be evident over a 5 to 10-year period. Few overstory trees are expected to be killed. Outside the burned areas, the conditions described in the affected environment for Oregon Wild unroaded areas would remain unchanged except by natural processes and ongoing management activities such hunting.

Prescribed burning would require the construction of handline which would include the cutting of some small diameter trees, snags that pose a hazard to workers, and the limbing-up (pruning) of other trees incidental to prescribed burning activities. This could cumulatively change density, composition, and structure of vegetation on approximately 267 acres in Oregon Wild unroaded area for 'fuels only' treatment units for Alternatives C, D, and E. Trees cut during handline construction would not be removed from the site. The sight of some random tree stumps left after handline construction incidental to prescribed burning activities could affect the natural appearing landscape.

[46] Fuels only treatment is a noncommercial activity designed to use fire to reduce fuel loading in areas over 30 percent slope and/or areas along the Walker Rim steeper slopes where machinery is not desired to help facilitate the return of frequent fire regimes.

**Alternative B**

There are 15 harvest units overlapping the Oregon Wild unroaded polygon totaling 291 acres of harvest treatments (Figure 64 and Table 132). This treatment would result in stumps being evident on the landscape for 20-30 years. Additionally, skid trails would also be evident for 20-30 years until regeneration started obliteration the evidence of mechanical operations.

There are two small areas (3 acres) along the boundary of the project area and the Oregon Cascades Recreation Area that Oregon Wild has included in their unroaded areas. There are two harvest units along this boundary (475, 480) where the treatment activities are thinning (harvest improvement cuts (HIM)) in these two units is designed to remove the less desirable trees and improve stand composition and quality followed by prescribed underburning would potentially reduce wildfire intensity as well as crown fire potential outside the OCRA.

There are no 'fuels only' treatment units in Alternative B however, there is some prescribed burning after treatment that would result in varying degrees of burned areas that would display a blackened color until grasses, brush, and herbaceous species recover. Dead trees, particularly small trees (saplings to poles), would be evident over a 3 to 5-year period. Few overstory trees are expected to be killed.

**Table 132. Oregon Wild Unroaded Areas that Overlap the Rim-Paunina Project Area for Alternative B**

| ALT | Harvest Unit ID | Prescription | Acres that overlap Oregon Wild's Unroaded Area |
|---|---|---|---|
| B | 610 | HIM | 11 |
| B | 620 | HTH | 24 |
| B | 621 | Aspen | 14 |
| B | 630 | HTH | 63 |
| B | 640 | HIM | 1 |
| B | 650 | HTH | 0 |
| B | 690 | HTH | 0 |
| B | 700 | HIM | 40 |
| B | 710 | HIM | 67 |
| B | 720 | HTH | 4 |
| B | 725 | HTH | 8 |
| B | 730 | HIM | 1 |
| B | 735 | HTH | 12 |
| B | 740 | HIM | 17 |
| B | 2010 | HTH | 28 |
| **Total** | | | **291** |

**Cumulative Effects**

The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project in the Walker Rim area, therefore there would be no additional or additive effect of road building that would remove additional acreages from the Oregon Wild unroaded areas.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees.

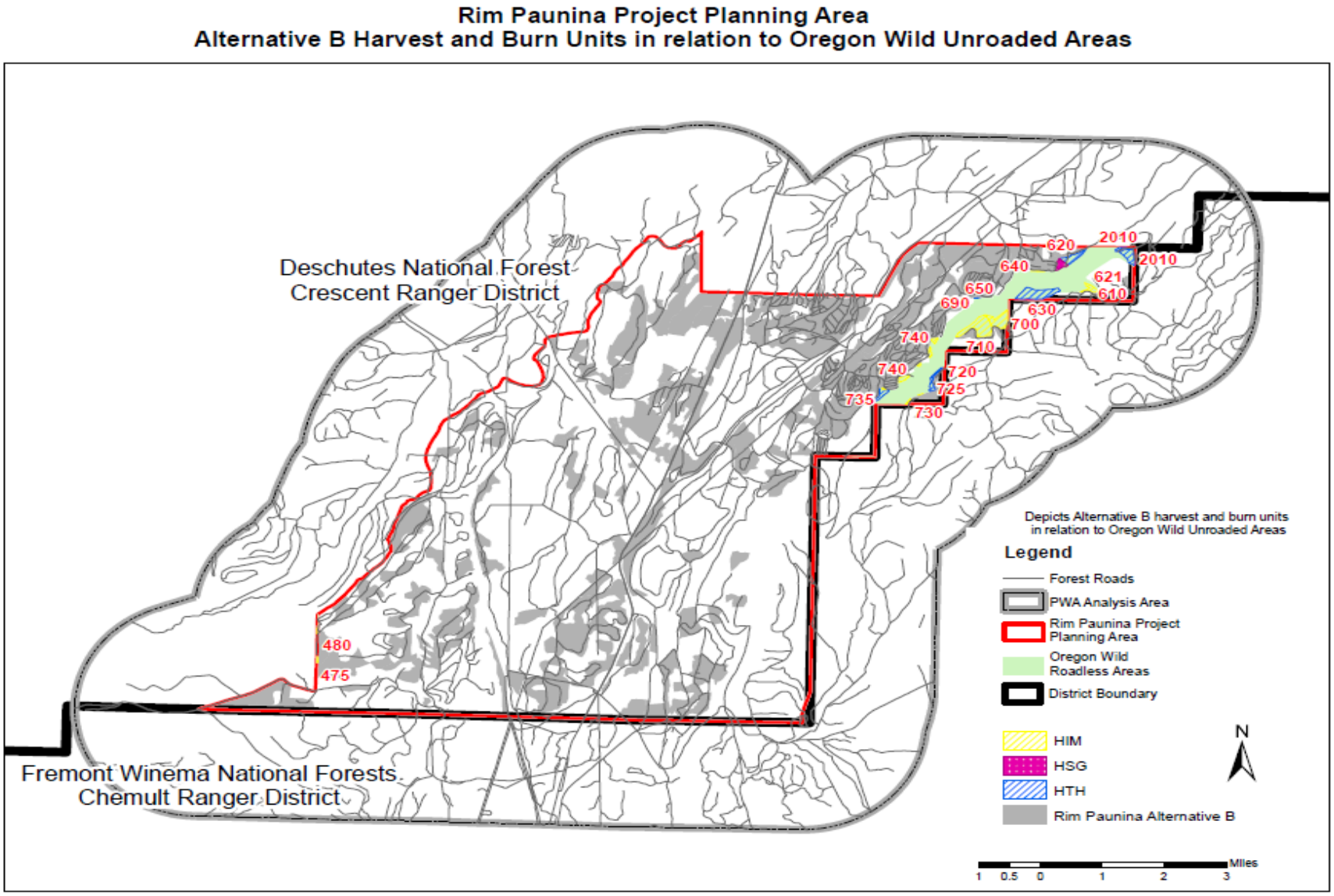


**Figure 64. Oregon Wild Unroaded Areas in Relation to Alternative B Harvest and Burn Units**

**Alternatives C and D**

There are 14 harvest units overlapping the Oregon Wild unroaded polygon totaling 273 acres of harvest treatments (Figure 65 and Table 133). This treatment would result in stumps being evident on the landscape for 20-30 years. Additionally, skid trails would also be evident for 20-30 years until regeneration started obliteration the evidence of mechanical operations.

There are two small areas (3 acres) along the boundary of the project area and the Oregon Cascades Recreation Area that Oregon Wild has included in their unroaded areas. There are no harvest units in this area for Alternatives C and D thus there would be no effects to these three acres.

**Table 133. Oregon Wild Unroaded Areas that Overlap the Rim-Paunina Project Area for Alternatives C and D**

| ALT | Harvest Unit ID | Prescription | Acres that overlap Oregon Wild's Unroaded Area |
|---|---|---|---|
| C and D | 610 | HIM | 11 |
| C and D | 615 | Fuels Only | 180 |
| C and D | 620 | HTH | 24 |
| C and D | 621 | Aspen | 14 |
| C and D | 625 | Fuels Only | 73 |
| C and D | 630 | HTH | 63 |
| C and D | 640 | HIM | 1 |
| C and D | 650 | HTH | 0 |
| C and D | 690 | HTH | 0 |
| C and D | 700 | HIM | 40 |
| C and D | 710 | HIM | 67 |
| C and D | 720 | HTH | 4 |
| C and D | 725 | HTH | 8 |
| C and D | 730 | HIM | 1 |
| C and D | 735 | HTH | 12 |
| C and D | 2010 | HTH | 28 |
| C and D | 3000 | Fuels Only | 14 |
| **Total** | | | **540** |

**Cumulative Effects**

The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project in the Walker Rim area, therefore there would be no additional or additive effect of road building that would remove additional acreages from the Oregon Wild unroaded areas.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees.

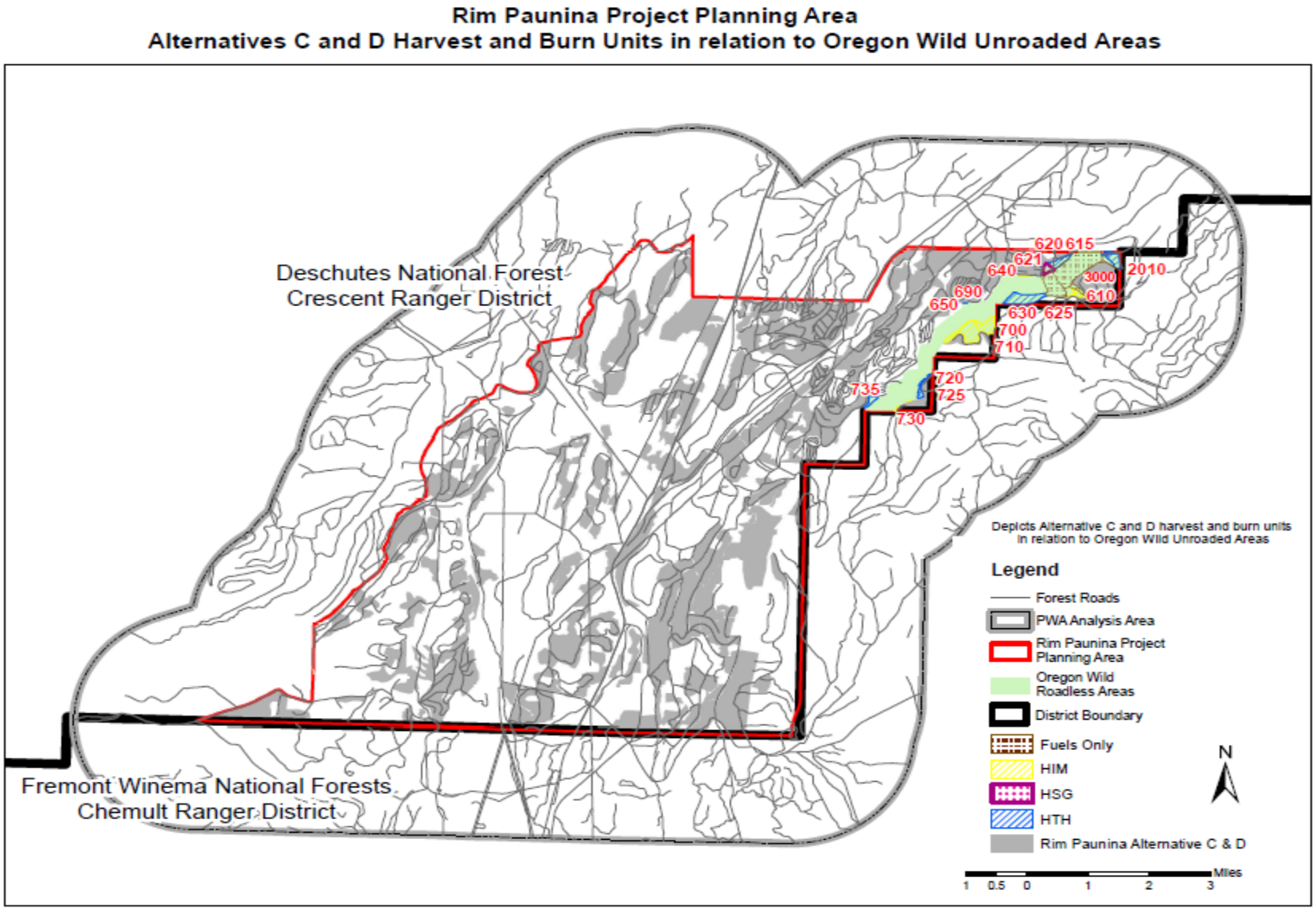


**Figure 65. Oregon Wild Unroaded Areas in Relation to Alternatives C and D Harvest and Burn Units**

**Alternative E**

There are 15 harvest units overlapping the Oregon Wild unroaded polygon totaling 290 acres of harvest treatments (Figure 66 and Table 134). This treatment would result in stumps being evident on the landscape for 20-30 years. Additionally, skid trails would also be evident for 20-30 years until regeneration started obliteration the evidence of mechanical operations.

There are two small areas (3 acres) along the boundary of the project area and the Oregon Cascades Recreation Area that Oregon Wild has included in their unroaded areas. There is one harvest unit along this boundary (480) where the treatment activity is thinning (harvest improvement cuts (HIM)) designed to remove the less desirable trees and improve stand composition and quality followed by prescribed underburning would potentially reduce wildfire intensity as well as crown fire potential outside the OCRA.

**Table 134. Oregon Wild's Unroaded Areas that Overlap the Rim-Paunina Project Area for Alternative E**

| ALT | Harvest Unit ID | Prescription | Acres that overlap Oregon Wild's Unroaded Area |
|---|---|---|---|
| E | 610 | HIM | 11 |
| E | 615 | Fuels Only | 180 |
| E | 620 | HTH | 24 |
| E | 621 | Aspen | 14 |
| E | 625 | Fuels Only | 73 |
| E | 630 | HTH | 63 |
| E | 640 | HIM | 1 |
| E | 650 | HTH | 0 |
| E | 690 | HTH | 0 |
| E | 700 | HIM | 40 |
| E | 710 | HIM | 67 |
| E | 720 | HTH | 4 |
| E | 725 | HTH | 8 |
| E | 730 | HIM | 1 |
| E | 735 | HTH | 12 |
| E | 740 | HIM | 17 |
| E | 2010 | HTH | 28 |
| E | 3000 | Fuels Only | 14 |
| **Total** | | | **557** |

**Cumulative Effects**

The Three Trails OHV project is implementing Alternative E (ROD Dec 2010) which is the designation of a motorized trail system that overlaps the Rim-Paunina project area. No roads would be constructed with the Three Trails OHV project in the Walker Rim area, therefore there would be no additional or additive effect of road building that would remove additional acreages from the Oregon Wild unroaded areas.

Table 19 has been reviewed for relevancy and there are no other known past, present, or foreseeable projects proposed in the Rim-Paunina project area that would build roads or harvest or cut trees.

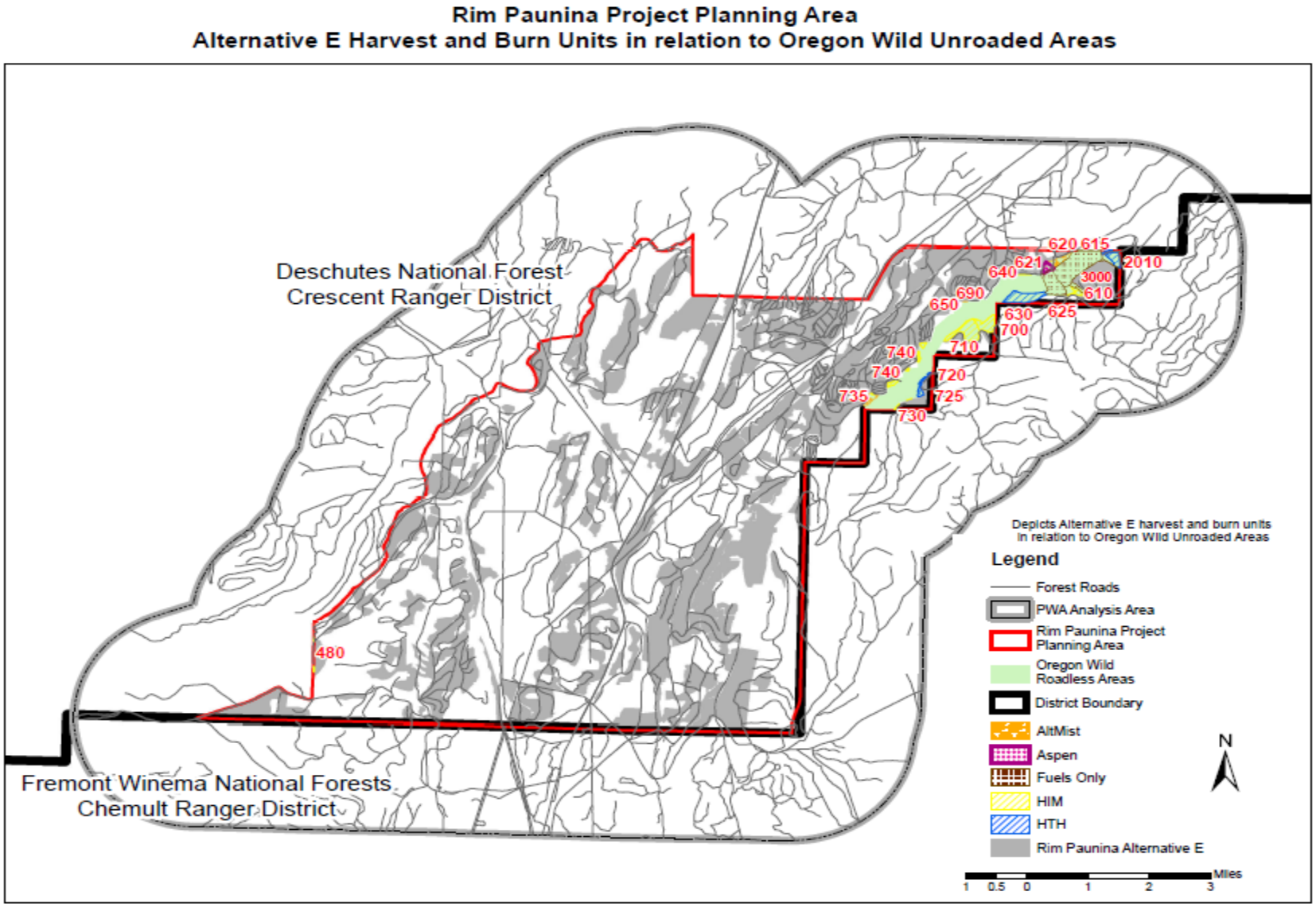


**Figure 66. Oregon Wild Unroaded in Relation to Alternative E Harvest and Burn Units**

# Other Disclosures

## Climate Change

The impacts on forests from climate change and the effects on climate from forest management are complex and difficult to predict. Although El Nino/Southern Oscillation and the Pacific Decadal Oscillation comprise the primary factors for climate variability in the Pacific Northwest (Climate Impacts Group[47]), the influence from global climate change is a growing concern. According to the Climate Impacts Group, based out of the University of Washington, climate modeling for the Pacific Northwest predicts a future rate of warming of approximately 0.5 degrees Fahrenheit per decade for the Pacific Northwest through at least 2050, relative to the 1970-1999 average temperature. Temperatures are projected to increase across all seasons, although most models project the largest temperature increases in summer (June-August), and the average temperatures could increase beyond the year-to-year variability observed in the Pacific Northwest during the 20th century as early as the 2020s.

The proposed and approved research addresses climate change as a research question: What is the long-term influence of climate change interacting with a set of density reduction/thinning prescriptions and fuel reduction on vegetation dynamics and forest structure? Climate change is a form of disturbance that has not been adequately addressed in past thinning and fuel reduction research. This portion of central Oregon has gone through at least five distinct periods of warming climate over the past 110 years (NASA Global Climate Change Website http://climate.jpl.nasa.gov). In the Western United States and at the continental scale (1 km), long-term satellite data shows consistently earlier onsets of spring greening and corresponding increases in length of growing season associated with projected climate change (Forest Service Climate Change Resource Center: http://www.fs.fed.us/ccrc). The ability to downscale current large scale projections to specific project-scale sites remains limited; therefore there is relative little confidence in most projections. Small changes in growing season duration may result in expansion of species that have relatively narrow habitat requirements.

The Rim-Paunina project area is topographically simplistic and contains essentially uniform or homogenous soils (deep pumice derived from the explosion of Mt. Mazama). It contains several relatively clear and distinct ecotones (boundaries between easily recognized plant associations) near the elevational break of the plant associations on Walker Rim. It also has two distinct zones of treatments.

Vegetation manipulation would occur on essentially two areas differentiated by elevation zones (approximately 4,200 feet (1,280 m) in the bottom of the rim ranging up to about 5,400 feet (1,636 m) with a western/southwestern aspect on the break. The working hypothesis is that initial or early indications of vegetation dynamics are most likely to become apparent in the shrub and herbaceous strata, and these dynamics would manifest as expansion of species from drier sites to those that are currently more moist as conditions become increasingly stressed. This means that shrubs and herbaceous species that dominate in plant associations on the flat topography near Highways 97 and 58, such as antelope bitterbrush (*Purshia tridentata*), would expand upward in elevation. Under this hypothesis, the niche space of individual species and entire assemblages of species would shift from the lower elevations to the rim. Shifts can be expected where disturbance, such as the small diameter thinning and return of a more frequent fire regime in the mixed conifer would provide access and growing space. As in the Pringle Falls Experimental Forest, this would provide a validity assessment for current efforts to downscale vegetation dynamic projections to 80 m resolution, and would provide insights into the effects of climate change at the community scale, presenting managers much needed information on the restructuring of

[47] Intergovernmental Panel on Climate Change (IPCC). Their reports (2007) provide the authoritative scientific basis for subsequent Forest Service analysis of the phenomenon. Information specific to the Forest Service can be found in the latest Synthesis and Assessment Product 4.4.24.

plant composition as a result of regional climate interacting with legacies of past management. These insights would inform management options to better incorporate these changes.

**Carbon Storage**

The Forests play a major role in the carbon cycle. Carbon stored in live biomass, dead plant material, and soil represents the balance between $CO_2$ absorbed from the atmosphere and its release through respiration, decomposition, and burning. Over longer time periods forests would continue to absorb carbon. Forests are biological systems that continue to gain and lose carbon via processes such as photosynthesis, respiration, and combustion; whether forests show a net gain or loss of carbon depends on the balance of species (*Issues in Ecology*, Report #13, Michael G. Ryun et al. 2010).

The Forest Service recognizes that carbon and sequestration are important issues both nationally and regionally. Currently, Forest Service national policy and guidance for managing carbon and sequestration does not exist. The tools for estimating carbon and sequestration are not fully developed at this time. A quantitative analysis and comparison between the alternatives of trade-offs between the amount of carbon stored or greenhouse gases emitted is not possible at the current project scale. It would be very difficult to determine the effects of this project on greenhouse gases directly, and therefore climate change indirectly, as there are currently no Federal statutes, regulatory standards, or policy direction on such effects. Until the agency adopts meaningful thresholds against which to weigh any project-related green house gas emissions, it would not be possible to determine a specific project's effects on GHGs or climate change. Attempts to place this project in the context of global warming would have to focus on portions related to carbon fixing, storing, and releasing. The scale of this action will likely be immeasurable when considered at a global scale.

It can be said, though, that thinning of stands under both alternatives, reduce competition for resources and favoring drought-tolerant species (ponderosa pine) would reduce the impacts of future drought cycles on tree mortality, and increase resistance to insect and fire mortality (Ritchie 2008). Also, if a crown fire burns through a forest that was thinned to a low density, the fire may change from a crown fire to a surface fire in which many trees can often survive the fire. In contrast, many or all of the trees in an unthinned stand would be killed by a crown fire.

> This contrast in survival has led to the notion that fuel treatments offer a carbon benefit: removing some carbon from the forest may protect the remaining carbon (*Issues in Ecology*, Report #13, Michael G. Ryun et al. 2010).

A common comment that is received from members of the public suggests that thinning is likely to remove more carbon than would be saved by avoiding fire and that we should consider the conclusions of Mitchell, Harmon, and O'Connell (2009) before attributing carbon benefits to fuel reduction. The interdisciplinary team has reviewed the paper; it does not support the notion that the Rim-Paunina project is likely to remove more carbon by harvest and return of periodic fire than would be saved by avoiding fire. The paper by Mitchell, Harmon, and O'Connell (2009) is the result of simulation exercises with three Pacific Northwest forest types: the east Cascades ponderosa pine forests, the west Cascades western hemlock-Douglas-fir forests, and the Coast Range western hemlock-Sitka spruce forests. Treatments simulated for the east Cascade ponderosa pine forests were similar to those proposed in Rim-Paunina (understory removal, prescribed fire, understory removal, and prescribed fire). Based on a forest ecosystem simulation model, the authors suggest that fuel reduction treatments in these ecosystems consistently reduced fire severity. For the east Cascade ponderosa pine forests, there was little or no trade-off incurred by managing these forests for both fuel reduction and carbon sequestration. The authors speculate that the removal of highly flammable understory vegetation led to a reduction in overall fire severity that consequently lowered overall biomass combustion, thereby allowing increased overall carbon storage.

Published research suggests that management action can have a positive effect on carbon storage. Hurteau et al. (2008) points out that in forests where fire exclusion has caused fuel accumulation (such as

at Walker Rim) tree density and forest fuel reduction activities can diminish the risk of stand-replacing fire, thereby promoting carbon storage. The basis for this work is four large recent fires, including the Biscuit Fire in southwest Oregon and the Hayman Fire in Colorado. The authors also point out that thinning treatments such as those proposed in the Rim-Paunina project would, by exposing more ground, snow, grass, etc., increase surface albedo[48], thereby increasing surface reflectance leading to a net cooling effect.

## Forest Plan Amendments

**Four Forest Plan Amendments are required.**
There are four site-specific amendments to the Deschutes National Forest Land and Resource Management Plan (Forest Plan) as amended for the proposed Rim-Paunina Project on the Crescent Ranger District. Three are for the Eastside Screens, harvest of trees over 21 inches and two related to Historical Range of Variability (HRV) and Late and Old Structure (LOS) scenarios, and the fourth is for the use of prescribed fire exceeding five acres within scenic views.

**Proposed Amendments**
The following identifies the apparent need for site-specific amendments to the Forest Plan (*Interim Eastside Screens*) followed by a section that explains the proposed change and the need for that change.

**1. Cutting of Trees over 21 Inches in Diameter**
In Alternative D, the project proposes a site-specific amendment to the *Interim Eastside Screens Appendix B 6(2.a*) 'Maintain all remnant late and old seral and/or structural live trees greater to or equal to 21 inches in diameter that currently exist within stands proposed for harvest activities." The proposed amendment would allow a timber sale to cut and remove trees greater than or equal to 21 inches in diameter.

**Need for Amendment and the Change Being Proposed**
Approximately 2,000 acres of ponderosa pine-dominated stands in all size classes along Walker Rim are heavily infected with dwarf mistletoe which is identified as a key issue that drove the development of Alternative D. Alternative D emphasizes a focused strategy to reduce the length of time in which large trees are absent from those areas most heavily infected with dwarf mistletoe (Key Issue #2). A very detailed on-the-ground inventory of presence of the disease emphasized the need to break the cycle of continual infection in pockets. This would be accomplished by creating openings in portions of the most heavily infected stands where ponderosa pine seedlings have little chance to advance beyond a seedling/sapling stage. In two to five acre openings (approximately778 acres total) in both LOS and younger stands, all trees, including those over 21 inches in diameter would be cut and removed followed by planting of appropriate species. In addition to addressing the future health of the stands, these openings would serve to create a mosaic of different tree sizes and densities within each stand. This silvicultural technique would also mimic historic stand variability. Facilitation of return to a frequent and low-intensity fire regime is also a component of this alternative (Key Issue #4).

In Alternative D, the project proposes a site specific amendment to the Interim Eastside Screen Appendix B 6 (2.a) "Maintain all remnant late and old seral and/or structural live trees ≥ 21" dbh that currently exist within stands proposed for harvest activities." The proposed amendment would allow a timber sale to cut and remove trees greater than or equal to 21 inch diameter trees. This removal of equal to or over 21 inch diameter trees would occur only within the group selection 2-5 acre openings.

[48] The albedo is the fraction of the incoming solar radiation reflected by the land surface, integrated over the whole viewing directions.

Alternative E proposes a similar prescription; however, the trees greater than or equal to 21 inches in diameter *would not* be removed by a timber sale and therefore would not need an Eastside Screen amendment. Mortality to trees greater than 21 inches in diameter would be induced by either prescribed fire or other methods such as blasting.

**2 and 3**. **Eastside Screen Appendix B 6(d) Scenario A and Harvest Activities in Late and Old Stands**
Appendix B 6 (d) Scenario A of the Eastside Screens states "*If either one or both late and old structural stages falls BELOW HRV in a particular biophysical environment within a watershed, then there should be NO NET LOSS from that biophysical environment. Do not allow timber harvest activities to occur within LOS stages that are BELOW HRV."* Two site-specific amendments to the Eastside Screens are proposed to:

- Allow a net loss of 145 acres of LOS for two biophysical environments in Alternative D (Table 135).
- Allow a timber sale to occur within LOS stages that are below HRV for all Action Alternatives.

**Need for Amendment and the Change Being Proposed**
Amendment #2 – Alternative D proposes to address severe mistletoe infection through a group selection prescription, removing all trees including those over 21 inches, which would result in a net loss of 145 acres of LOS in the ponderosa pine and mixed conifer biophysical environments (Table 135). Given its persistent nature, the best way to control dwarf mistletoe is to prevent infection by protecting young tree regeneration (Conklin 2000). Alternative D proposes to facilitate young tree regeneration by creating 2-5 acre openings through the most severely infected stands, removing mistletoe and allowing young trees to grow in a relatively mistletoe-free environment. Therefore, a site-specific amendment to Appendix B 6(d) Scenario A is needed to allow a net loss in LOS acreage in order to create these mistletoe-free openings.

Amendment #3 - In response to Key Issue #2, all Action Alternatives propose a timber sale within the mixed conifer single-stratum biophysical environment, in which LOS is currently below HRV. Treatments (thinning, improvement cuts, and mistletoe treatment) are proposed in areas where the development of large trees is currently impeded, or existing large trees are at risk from fire or insects and disease. The objective of these treatments would be to improve conditions for the development and/or maintenance of large trees, thus retaining or enhancing LOS acreage in the long-term. All Action Alternatives would need to be able to employ a commercial timber sale to accomplish objectives. Therefore, a site-specific amendment to Appendix B 6(d) Scenario A is needed to allow timber harvest in LOS stages that are currently below HRV. All treated areas (except for those acres in Alternative D noted in Amendment #2) would remain in an LOS condition with no net loss of LOS.

**Table 135. Existing LOS and Changes in Alternative D**

| Changes in LOS for Alternative D | | | | |
|---|---|---|---|---|
| | **Ponderosa Pine (Dry)** | | **Mixed Conifer (Dry)** | |
| | **Existing Acres LOS** | **Acres Treated no longer LOS** | **Existing Acres LOS** | **Acres Treated no longer LOS** |
| Single Stratum, Large Trees | 0 (Below HRV) | 0 | 1,536 (Below HRV) | 46 |
| Multi-Stratum, Large Trees | 2,698 (Within HRV) | 89 | 1,597 (Within HRV) | 10 |

**4. Prescribed Underburning More than 5-Acres in Scenic Views Foreground**
Under all action alternatives, the project proposes a site specific amendment to the Deschutes Land and Resource Management Plan Scenic Views M9-90 to allow prescribed burns in Foreground areas that are visible to the public in larger than 5-acre blocks.

**Need for Amendment and the Change Being Proposed**
The current Land and Resource Management Plan standards and guidelines for maintaining visual quality restrict the activities that can be visible to the "casual observer" within certain areas, including scenic view zones of retention and partial retention in the Scenic Views management allocations that occur along the corridors of State Highways 58 and 97.

The scenery in the Rim-Paunina analysis area is undergoing a gradual but noticeable change, particularly in the ponderosa pine that borders the highway. Fire exclusion has allowed smaller trees to obstruct the view of large ponderosa pine trees. An overstocked understory with smaller trees is resulting in overcrowding and increased competition with the larger trees, creating a mortality rate in the large trees that surpasses expected large tree replacement. In addition, dwarf mistletoe infestations are severe in several stands that contain large ponderosa pine trees. Thinning would be followed by slash busting and prescribed underburning including units along Highways 58 and 97. These units are considered part of the visual component in Scenic Views "Partial Retention Foreground."

M9-90 (LRMP page 4-131) states: *Low-intensity prescribed fires will be used to meet and promote the Desired Visual Condition within each stand type. Prescribed fire and other fuel management techniques will be used to minimize the hazard of a large high intensity fire. In foreground areas, prescribed fires will be small, normally less than 5 acres, and shaped to appear as natural occurrences. If burning conditions cannot be met such that scorching cannot be limited to the lower 1/3 of the forest canopy, then other fuel management techniques should be considered.*

Limiting acreage for the use of prescribed fire to five acres or less in foreground areas of Scenic Views would not meet the goal of reducing wildfire risk, providing safety corridors for the public, or creating a defensible fuel break for an advancing fire. It is necessary to amend the five acre limitation for fuels treatments to meet stand and fire management objectives. These areas would remain at substantial risk to mortality from wildfire without a more comprehensive and intensive system of treatments, including prescribed fire.

The project proposes up to approximately 468 acres of prescribed fire within foreground areas of Scenic Views MA (depending on alternative chosen), with up to approximately 162 acres visible from the highways (Table 115). To maintain scorching below 30 percent of the crown, treatments would be based on the following:

- If stand density is too dense to burn without substantial mortality, thinning with follow-up slash pile and burning.
- If shrubs are present and stand density is low, slash busting[49] would be followed with prescribed burning. Some mortality could occur.
- If stand density is low and no shrubs are present, the area would be assessed to determine if treatment is needed.
- To achieve underburning objectives, more than one season of burning may be necessary.

Ecologically, the reintroduction of fire is consistent with the restoration concept of more frequent low-intensity fire on the landscape. Historically, fire played the bigger role in influencing forest succession.

[49] SB = Slash busting (brush mastication) with no pile disposal or handpile with disposal in scenic areas

Interfering with one disturbance agent (fire) has increased the influence of other disturbance agents (insect and disease; Gara 2000). These agents now exhibit their influence over entire landscapes in episodes lasting decades, which is a result of replacing open stands of shade intolerant tree species with dense, closed stands of shade-tolerant species (Agee 1993).

### For the Determination of Significance

The Secretary of Agriculture's implementing regulation indicates the determination of significance is to be "[b]ased on an analysis of the objectives, guidelines, and other contents of the forest plan" (36 CFR 219.8). The Forest Service has issued guidance for Plan amendments when using planning regulations in effect before November 9, 2000. This guidance, in Forest Service Manual (FSM) 1926.51 describes non-significant amendments as:

1. Actions that do not significantly alter the multiple-use goals and objectives for long-term land and resource management;
2. Adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments do not cause significant changes in the multiple-use goals and objectives for long-term land and resource management;
3. Minor changes in standards and guidelines; and/or
4. Opportunities for additional projects or activities that will contribute to achievement of the management prescriptions.

Four additional factors were considered in this analysis: timing; location and size; goals, objectives, and outputs; and management prescriptions. An analysis of these four factors is presented below.

***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). All four of these plan amendments would take place in the 22nd year of the Forest Plan, would take place immediately, and are specific to this project.

***Location and size:***

*This factor takes into account the location and size of the area involved in the change and the affected area's relationship to the overall planning area. Generally, the smaller the area affected, the less likely the change is to be a significant change in the Forest Plan.*

The first Forest Plan Amendment (FPA) would allow cutting of trees over 21 inches in diameter in mistletoe-infested ponderosa pine stands along Walker Rim. This would be accomplished through the creation of two to five acre openings on approximately 778 acres.

The second FPA would allow a net loss of LOS for two biophysical environments in Alternative D. This would occur on approximately 145 acres of 5,831 acres of existing LOS (2.5 percent) in the Ponderosa Pine (dry) and Mixed Conifer (dry) PAGs (Table 135).

The third FPA would allow for a timber sale within late and old structural stages (LOS) that are below HRV for all Action Alternatives. This would occur on 619 acres in Alternative B, 556 acres in Alternatives C&D, and 619 acres in Alternative E.

The fourth FPA would allow for prescribed burning in Scenic Views Foreground areas that are visible to the public in larger than 5-acre blocks. This would occur on only 162 acres scattered across parts of

seven units visible from along Highways 58 and 97, and is so small (0.01 percent) that it would be impractical to assess in comparison to the 1.6 million acres of the Deschutes National Forest.

***Goals, Objectives and Outputs:***
*This factor examines whether the change alters long-term relationships between the levels of goods and services projected by the Forest Plan. In most cases, changes in outputs are not likely to be a significant change in the Forest Plan unless the change would forego the opportunity to achieve an output in later years.*

For all of the Forest Plan Amendments, these are minor changes in one interim standard that would not alter the multiple-use goals and objectives for long-term land and resource management. The Eastside Screens were intended to avoid management activities in the interim that would move conditions away from the HRV. The proposed thinning, including removing trees greater than or equal to 21 inch diameter would shorten the gap-in-time where large disease-free trees are absent on the landscape and provide the planted seedlings with more resilient conditions that would allow development of old-growth structural characteristics with trees able to survive for centuries.

Once treated, 145 acres would no longer remain in LOS however; the associated thinning prescriptions follow direction in Interim Wildlife Standard (6. d. 2. c.) to encourage the development and maintenance of large diameter, disease-free, open-canopy structure. The thinning will also follow direction to "manipulate vegetative structure that does not meet LOS conditions in a matter that moves it towards these conditions because thinning in the mid-seral structural stages (that are above HRV for both of the PAGs) will move the stands towards LOS."

Prescribed fire on the landscape would address the past fire exclusion policy that has created an overcrowded, dense understory with little or no ponderosa pine regeneration. Also the lack of periodic, low-intensity fire has likely exacerbated conditions where the endemic disease dwarf mistletoe has spread throughout the stands. The lack of live, healthy large ponderosa pine is contrary to what visitors expect along a scenic corridor in central Oregon's high desert forests. The goal is to reestablish a frequent, low-intensity fire regime appropriate for the Rim-Paunina area.

***Management Prescriptions:***
*This factor accounts for whether the change in a management prescription is only for a specific situation or whether it would apply to future decisions throughout the planning. It evaluates how the change alters the desired condition of the land and resources or the anticipated goods and services to be produced.*

These four amendments are being proposed to manipulate a very small segment of the forest towards a long-term, healthy, disease-free environment. These amendments to the *Interim Eastside Screens* and the *Deschutes Land and Resource Management Plan* standards and guidelines would not change the desired future condition for land and resources from that contemplated by the existing management direction in the Land and Resource Management Plan, which has a management strategy dealing with multiple levels of dwarf mistletoe infections, listed in Table 4-29 (DLRMP p. 4-39), from 'eliminate inoculums by regeneration harvest" to "remove overstory and thin understory to maintain infections at low levels."

Allowing greater visual evidence of prescribed burning in scenic corridors achieves the desired conditions for greater prominence of low-intensity, frequent fire in appropriate stands. None of these Forest Plan Amendments apply to future decisions.

## Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

The Multiple Use- Sustained Yield Act of 1960 requires the Forest Service to manage National Forest System lands for multiple uses (including timber, recreation, fish and wildlife, range and watershed). All renewable resources are to be managed in such a way that they are there for future generations. Thinning activities that provide a commercial product, or use of standing timber, can be considered a short term use of a renewable resource. As a renewable resource, trees can be re-established and grown in again if the productivity of the land is not impaired.

Maintaining the productivity of the land is a complex, long-term objective. All alternatives protect the long-term objective of the analysis area through the use of specific Forest plan Standards and Guidelines, mitigation measures, and BMPs. Long-term productivity could change as a result of the various management activities proposed in the alternatives. Timber management activities would have a direct, indirect, and cumulative effect on the economic, social, and biological environment. Those effects are disclosed in Chapter 3 of this analysis.

## Unavoidable Adverse Effects

Beneficial and adverse effects on the human environment that might result from implementation of the Action Alternatives, which are considered in detail, are analyzed earlier in this Chapter. The National Environmental Policy Act requires disclosure of "…any adverse environmental effects which cannot be avoided should the proposal be implemented…." (40 CFR 1502.16).

Several adverse effects, including some that are minimal and/or short term were identified during the analysis. Adverse effects are associated with all alternatives, including the No Action and the Action Alternatives. Resource protection measures or mitigations were identified for each adverse effect associated with an Action Alternative as a means to lessen or eliminate such effects on specific resources. See the section titled "Resource Protection Measures" in Chapter 2 of this EIS. Resource areas determined to be potentially adversely affected (resulting for any of the alternatives- including the No Action and the Action Alternatives) are documented within the appropriate Environmental Consequences section of each resource in Chapter 3. The following is a summary of some of the resource areas that may suffer adverse effects associated with the action alternatives.

### *Wildlife*

The complexity of analysis shows that there are trade-offs when managing wildlife habitat but wildlife species are not necessarily winners if habitat is gained or losers if habitat is lost. Treatments result in a more resilient landscape, more closely resembling the historic range of variability that the species developed in and a landscape returning to a more frequent fire regime reducing risk to all habitats and in which all species benefit in the long term. Reference discussions in Chapter 3 under "Wildlife" for disclosure of effects for Threatened and Endangered Species, Management Indicator Species, Regional Forester Sensitive Species, Birds of Conservation Concern, and Big Game.

### *Soils*

Under Alternative B, detrimental soil conditions would remain on 1,196 acres, followed by 1,163 acres in Alternative C; 1,160 acres in Alternative D; and 1,329 acres in Alternative E. These estimates are very

conservative. All activities would be consistent with Forest and Regional standards and guidelines for soil productivity with no units that exceed the 20 percent disturbance standards (Table 136 to Table 139 in Appendix C). It is expected that enough fallen trees and other organic materials would be available after harvest activities to meet recommended guidelines for coarse woody debris retention in the short-term. Therefore, the proposed actions comply with Regional and LRMP standards and guidelines for maintaining soil productivity within all proposed activity areas without restoration (subsoiling).

***Invasive Species Plants***

Invasive plants sources come from existing sources already within the Rim-Paunina project area as well as outside of the National Forest, and cannot therefore be completely mitigated with any action confined to Forest Service authority. Project Design Features designed to reduce the introduction and spread of invasive weeds either within or into the Rim-Paunina project area are listed in Chapter 2. A relative risk rating is disclosed for each action alternative.

***Recreation***

Overlapping Forest management activities may change the recreation experience for some forest visitors.

## Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights of-way or road.

The action alternatives have the potential to create effects that could cause irreversible damage to soil productivity. There is low risk for mechanical disturbance to cause soil mass failures (landslides) due to the inherent stability of dominant land types and the lack of seasonally wet soils on steep slopes. Careful planning and 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. The action alternatives include soil restoration activities (subsoiling) to improve the hydrologic function and productivity on detrimentally disturbed soils.

## Incomplete and Unavailable Information

The Council on Environmental Quality's implementing regulations for the National Environmental Policy Act requires, "When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking." (40 CFR 1502.22)

The Rim-Paunina analysis is consistent with this requirement within each resource area, as there are no critical pieces of missing information.

## Energy Requirements

For environmental impact statements, NEPA requires a discussion of the energy requirements and conservation potential of proposed alternatives and mitigation measures [40 CFR 1502.18 (e)]. Under the Action Alternatives, additional consumption of fossil fuels and human labor would be expended for the use of vehicles transporting Forest workers, chainsaws, heavy equipment and trucks. Fossil fuel would not be a retrievable resource. There are no irregular energy requirements involved in implementing any of the action alternatives.

### USDA Civil Rights Policy

The Civil Rights Policy for the USDA, Departmental Regulation 4300-4 dated May 30, 2003, states that the following are among the civil rights strategic goals; (1) managers, supervisors, and other employees are held accountable for ensuring that USDA customers are treated fairly and equitably, with dignity and respect; and (2) equal access is assured and equal treatment is provided in the delivery of USDA programs and services for all customers. This is the standard for service to all customers regardless of race, sex, national origin, age, or disabilities.

Disparate impact, a theory of discrimination, has been applied to the Rim-Paunina planning process in order to reveal any such negative effects that may unfairly and inequitably impact beneficiaries regarding program development, administration, and delivery. The objectives of this review and analysis are to prevent disparate treatment and minimize discrimination against minorities, women and persons with disabilities and to ensure compliance with all civil rights statutes, Federal regulations, and USDA policies and procedures.

The project alternatives, given the size of potential social and economic effects, are not likely to result in civil rights impacts to Forest Service employees or customers of its program.

### Prime Farmland, Rangeland, and Forest Land

The Secretary of Agriculture issued memorandum 1827 which is intended to protect prime farm lands and rangelands. The Rim-Paunina analysis area does not contain any prime farmlands or rangelands. Prime Forest Land, as defined in the memorandum, is not applicable to lands within the National Forest System.

### Federal Advisory Committee Act (FACA) of 1972

The Rim-Paunina Project is consistent with the Federal Advisory Committee Act of 1972 (as amended) because collaboration consisted of a diverse group of stakeholders ranging from members whose advocacy was for forest conservation, timber industry, wildlife, and recreation. The group was convened through a third party member of the Central Oregon Intergovernmental Council (COIC). After the initial collaborative scoping meeting, eight collaborative process meetings were held over an 11 month period and the National Environmental Policy Act (NEPA) public process was used to weigh in. All input from the collaborative group also followed the same requirements as the concurrent NEPA public involvement process. All meetings were open to the public, were held outside of Forest Service facilities, and followed Federal Advisory Committee Act guidelines. The goal for the Forest Service was to provide a more transparent process from scoping to decision and to build relationships for potential future collaboration. It was also to achieve quality feedback and to ensure all possible alternatives were explored.

# Chapter 4. Consultation and Coordination

## Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental impact statement:

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***Tim Foley, USDA Forest Service, Deschutes National Forest, Crescent Ranger District, Environmental Coordinator***
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***Joan Kittrell, USDA Forest Service, Deschutes National Forest, Crescent Ranger District, Wildlife Biologist***
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Experience: Forest Service 30 years; including positions in silviculture and timber, biologist with Forest Service 18 years

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***Chris Mickle, USDA Forest Service, Deschutes National Forest, Crescent Ranger District, Environmental Coordinator (retired August 2011)***
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***Christina Veverka, USDA Forest Service, Deschutes National Forest, Crescent Ranger District, Ecologist / Botanist***

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Education: BA Biology, University of San Diego; MA Biology, Idaho State University
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***Vincent Voelker, USDA Forest Service, Deschutes National Forest, Crescent Ranger District, Roads Manager***

Contribution: Transportation planning
Experience: Forest Service since 2006; includes positions in trail/roads survey and design, transportation planning and project management

# Distribution of the Environmental Impact Statement

**Environmental Impact Statement**

The Forest Service consulted with or received project comments from individuals, agencies, tribes, and non-Forest Service persons during the development of the Draft Environmental Impact Statement.

**Federal Agencies**

U.S. Fish and Wildlife Service

**State Government**

Oregon Department of Fish and Wildlife
State Historic Preservation Office

**Tribes**

Burns Paiute Tribe
Confederated Tribes of the Warm Springs Reservation
The Klamath Tribes

**Organizations**

Rim-Paunina Collaborative group
Oregon Wild

**Individuals**

## List of Agencies, Organizations, and Persons to Whom Copies of the Statement are Sent

The following requested to receive a copy (hardcopy or CDROM) of the Draft Environmental Impact Statement.

**Federal Agencies**
Environmental Protection Agency- Region 10
Office of Environmental Policy and Compliance
USDA National Agricultural Library
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

**State Government**
Oregon Department of Fish and Wildlife
Oregon Department of Forestry

**Tribes**
The Klamath Tribes

**Organizations**
Oregon Chapter, Sierra Club
Oregon Wild
The Nature Conservancy

**Individuals**
RD Buell
Chuck Burley
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Karen Coulter
Tim English
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Tim Lillebo
Marilyn Miller
Joni Mogstad
Mike Morris
Larry Pennington
Ben and Kay Sunderland
Carl Wilmsen

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# Glossary

**Access Management**- Management of the ingress and egress of people on National Forest System lands. Generally used to describe motorized use allowed.

**Access Rights**- A privilege or right of a person or entity to pass over or use another person's or entity's travel way. (36 CFR 212.1, FSM 5460.5- Rights of Way Acquisition, FSM 7700- Transportation System).

**Activity** - A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance or maintain forest outputs or achieve administrative or environmental quality objectives (Deschutes LRMP).

**Adaptive Management**- A type of natural resource management that implies making decisions as part of an on-going process. Monitoring the results of actions would provide flow of information that may indicate the need to change a curse of action. Scientific findings and the needs of society may also indicate the need to adapt resource management to the new information.

**Administrative Use** - Motorized use of a road, trail or area for limited administrative use by the Forest Service; use of any fire, military, emergency or law enforcement vehicle for emergency purposes. Authorized use of any combat or combat support vehicles for national defense purposes; Law enforcement response to violations of the law, including pursuit; and, permitted use and occupancy of National Forest System lands (USDA- Forest Service. 2004. 36 CFR part 212, 251, 261, and 295).

**Advanced Regeneration** - Small trees, usually less than one inch in diameter, that are growing under mature trees prior to planned harvest activities.

**Affected Environment** - The natural environment that exists at the present time in an area being analyzed.

**Air Shed**- A geographical area that, because of topography, meteorology and climate, shares the same air.

**Alternative**- One of several policies, plans or projects proposed for the decision-making.

**Aquatic Ecosystem-**The stream channel, lake or estuary bed, water, biotic communities and the habitat features that occur within.

**Archaeological**- A term used to describe any cultural resources deposited on or in soil strata from past human activities. However, these cultural deposits generally must be at least 50 years old to be considered archaeological.

**Area-** A discrete, specifically delineated space that is smaller, and in most cases much smaller, than a Ranger District.

**Arterial Road**- A forest road that provides service to large land areas and usually connects with other arterial roads or public highways. (FSH 7709.54 – Forest Transportation Terminology Handbook, no longer in print).

**Bald Eagle Management Areas (BEMAs)-** Areas managed under the Deschutes National Forest land and Resource Management Plan for protection of the threatened northern bald eagle. BEMAs provide nesting and roosting habitat for the species.

**Best Management Practices (BMP)**- Practices designed to prevent or reduce water pollution. Also referred to as Soil and Water Conservation Practices (SWCPs).

**Big Game**- Those species of large mammals normally managed for sport hunting.

**Biological Diversity-** The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems and ecological processes that connect everything in a common environment.

**Biota-** The plant and animal life of a particular region.

**Borrow Source**- An area from which sand, gravel or stone is taken for use in another area.

**Bridge**- A road or trail structure, including supports, erected over a depression or obstruction such as water, a road, trail or railway and having a deck for carrying traffic or other loads.\

**Canopy**- the uppermost spreading branchy layer of a forest.

**Canopy Base Height**- The height above the ground of the first canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of a fire. Low canopy base heights have been shown to initiate crown fire behavior.

**Canopy Bulk Density-** Canopy bulk density (CBD) describes the density of available canopy fuel in the stand. It is defined as the mass of available canopy fuel per canopy volume unit.

**Capability**- The potential of an area of land to produce resources, supply goods and services and to allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fire, insects and disease.

**Chain**- A standard measurement for rate of fire spread (approximately 66')

**Classified Road**- Road wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, national Forest System roads and other roads authorized for motor vehicle use pursuant to 36 CFR 212.51 on a Motor Vehicle Use Map (MVUM). (36 CFR 212.1, FSM 7705 - Transportation System). A road under Forest Service jurisdiction.

**Clean Air Act** - (42 U. S. C. 7609). Section 309 provides authority for the Environmental Protection Agency to review other agency environmental impact statements.

**Closed Roads**- Roads on the Forest Transportation system available for motorized administrative or emergency use, but not open to public motorized use. Also called long-term intermittent and is classified as a Maintenance Level I road.

**Collector Road**- A forest road that serves smaller land areas than an arterial road. Usually connects forest arterial roads to local forest roads or terminal (FSH 7709.54- Forest Transportation Terminology Handbook, no longer in print).

**Concentrated Use Area**- An area identified by the Forest Service characterized by recurring frequent and relatively dense dispersed recreation and where some continuing site impacts have been recorded.

**Concern**- (Also management concern). An issue, problem or condition which constrains the range of management practices identified by the Forest Service in the planning process.

**Condition Classes**- A function of the degree of departure from historical fire regimes. Condition Class I is within or near historical conditions; Class III is significantly altered from historical regimes.

**Connectivity (of habitats)-** The linkage of similar but separated vegetation stands by patches, corridors or 'stepping stone' of like vegetation. This term can also refer to the degree to which similar habitats are linked.

**Corridor-** Elements of the landscape that connect similar areas. Streamside vegetation may create a corridor of willows and hardwoods between meadows where wildlife feed.

**Council of Environmental Quality (CEQ)-** The Council issues regulations binding all federal agencies, to implement the procedural provisions of the national Environmental Quality Act (NEPA). The regulations address the administration of the NEPA process, including the preparation of Environmental Impact Statements (EIS) for major federal actions which significantly affect the quality of the human environment.

**Cover**- Any feature that conceals wildlife or fish. Cover may be dead or live vegetation, boulders, or undercut streambanks. Animals use cover to escape from predators, rest or feed.

**Critical Habitat-** Areas designated for the survival and recovery of federally listed threatened or endangered species.

**Crop Trees**- Trees which are considered suitable to meet long term management objectives for an analysis area. These may also be referred to as healthy or manageable trees. This may include both the physical make-up of the tree as well as the species.

**Cross-country Travel**- Travel over terrain not on designated roads and/or trails.

**Cryic**- Soils in this temperature regime have a mean annual temperature higher than 0°C but lower than 8°C.

**Cultural Resource-** An umbrella term used to describe a variety of resources, including archaeological or historic remains, folklore and oral traditions and geographic areas traditionally ascribed to have historical significance to a given culture.

**Cumulative Effects or Impacts-** The impact on the environment that results from incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other action. Cumulative effects or impacts can result from individual minor but collectively significant actions taking place over a period of time.

**Cycle**-Applied to uneven-aged management, it is the time interval between harvest entries. It should be noted that harvest entries in uneven-aged management are to leave residual levels of growing stock which should not need treatment for at least one cycle length.

**Draft Environmental Impact Statement (DEIS)-** The draft version of the Environmental Impact Statement that is released to the public and other agencies for review and comment.

**Designated road, trail or area-** A National Forest System road, a National Forest System trail, or an area on National Forest System lands that is designated for motor vehicle use pursuant to §212.51 on a motor vehicle use map.

**Desirable species**- Any species of plant or animal which is considered to be compatible with meeting management goals and objectives.

**Detrimental Soil Disturbance**- Compacted, displaced, eroded or burned soil conditions incurred by management, recreational or natural activities that are capable of reducing the productivity of the soil resource.

**Developed Recreation-** recreation that requires facilities that, in turn, result in concentrated use of the area. For example, skiing requires ski lifts, parking lots, buildings and roads. Campgrounds require roads, picnic tables and toilet facilities.

**Dispersed Recreation-** Recreation with few developed amenities such as structures, developed campsites or toilets. Dispersed recreation is generally less directly constrained by management controls on movement or by enforcement activities, but must comply with posted orders or restrictions for areas under management. Dispersed campers for instance, can choose to camp in places that are underdeveloped, so long as they meet the general posted rules for site protection. The term dispersed recreation usually implies lower visitor use densities. Dispersed recreation may be motorized or non-motorized.

**Disturbance**- Events that such as a forest fire or insect infestation that alters stand structure composition or function of an ecosystem.

**Diurnal** – Active during the daytime, resting at night.

**Early Seral**- Plants which inhabit a disturbed site within the first few years subsequent to the disturbance.

**Ecosystem**- An arrangement of living and nonliving things and the forces that move among them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildfire are two of the forces that act within ecosystems.

**Effects-** Environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate and related effects on air, water and other natural systems including ecosystems.

**Emergency Need**- An urgent maintenance need that may result in injury, illness, or loss of life, natural resource or property; and must be satisfied immediately. Emergency needs generally require a declaration of emergency or disaster, or a finding by a line office that an emergency exists.

**Endangered Species**-Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior and endangered in accordance with the 1973 Endangered Species Act.

**Endangered Species Act**- The Act which requires consultation with U.S. Fish and Wildlife Service if practices on National Forest System lands may impact a threatened or endangered plant or animal species.

**Engineering Analysis-** An analysis and evaluation conducted by a qualified engineer or under the supervision of a qualified engineer of a NFS road, road segment or road being considered for mixed motorized use. The analysis and evaluation may include recommended mitigation measures. The analysis may simply be simply documentation of engineering judgment or maybe a more complex engineering report that includes many factors related to mixed motorized use.

**Environmental Analysis**- An analysis of alternative actions and their predictable long and short-term effects. Environmental analysis include physical, biological, social and economic factors.

**Environmental Impact Statement (EIS)-** A statement of the environmental effects of a proposed action and alternatives to it. It is required for major federal actions under Section 102 of the National Environmental Policy Act (NEPA) of 1969 and released to the public and other agencies for comment and review. It is a formal document that must follow the requirements of NEPA, the Council for Environmental Quality (CEQ) guidelines and directives of the agency responsible for the project proposal.

**Excess Trees-** Trees which are considered not needed in the stand in order to meet management objectives.

**Extended Attack**- When a fire has not been contained by the initial attack resources dispatched to the fire, would not have been contained within the management objectives that are established for that zone or area, and have not been contained within the first operational period.

**Extirpated**- Local extinction.

**Facilities-** Transportation planning, road management and operation, fleet equipment and engineering services (for example: administrative buildings, water and sanitation systems, sanitary landfills, dams, bridges and communication systems).

**Fauna-** The animal life of an area.

**Fire Management-** All activities required for the protection of resources from fire and the use of fire to meet land management goals and objectives.

**Fire Regime**- A function of the historical frequency of fire and the degree of severity of those fires.

**Flood Plain-** A lowland adjoining a watercourse. At a minimum the area is subject to a 1% or greater chance of flooding in a given year.

**Flora-** The plant life of an area

**Forage-** All browse and non-woody plants that are eaten by wildlife or livestock.

**Forb**- A broadleaf plant that has little or no woody material in it.

**Forest Road or Trail-** A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

**Forest Supervisor**- The official responsible for administering National Forest lands on an administrative unit, usually consisting of one or more Ranger Districts which comprise the National Forest. The Forest Supervisor reports to the Regional Forester.

**Fuels**- Vegetative matter, dead or alive, that burns in a fire. It is broadly categorized by the following categories:

- Surface or ground fuels are within a foot of the ground.
- Ladder fuels exist when you have a continuous vertical arrangement of fuel that easily allows fire to go from ground level into the tree canopy.
- Crown fuels are the tree limbs and leaves that can burn with enough heat and/or wind.
- Live fuels are the green (live) herbs and shrubs.

**Fuel Models-** Fuel models are a tool used to standardize discussion of fuel conditions on a landscape. Fuel conditions, defined by quantity and arrangement, have been categorized into 40 standard descriptive fuel models (Scott and Burgan 2005).

**Fuel Treatment**- Manipulation or removal of fuels to reduce the likelihood of ignition and/or lessen potential damage and resistance to control (e.g. lopping, pruning, chipping, crushing, mastication, piling and burning).

**Game Species-** Any species of wildlife or fish that is harvested according to prescribed limits and seasons.

**Geographical Information Systems (GIS)-** GIS is a computer technology that uses a geographic information system as an analytic framework for managing and integrating date, solving a problem or understanding a past, present or future situation. (http://www.gis.com/whatisgis/index.html, 2006)

**Group Selection-** A stand management method in which silviculturalists identified groups of trees which need to be removed from a stand of trees in order to meet management objectives.

**Habitat-** The area where a plant or animal lives and grows under natural conditions.

**Habitat Capacity**- The ability of a land area or plant community to support a given species of wildlife.

**Hiding Cover-** The vegetation that would hide ninety percent of an elk from the view of a human at a distance of 200 feet or less. The distance which the animal is essentially hidden is called sight distance.

**High Clearance Vehicle**- Generally a truck, pickup truck, SUV or ATV with a road clearance that allows travel on low standard roads without vehicle damage. Usually greater clearance than a standard passenger vehicle.

**Highway Legal Vehicle-** Any motor vehicle that is licensed or certified under state law for general operation on all public roads in the state. Operators of highway-legal vehicles are subject to state traffic law including requirements for operating licensing.

**Historic Property**- Any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion in, the National Register for Historic Places. This term includes artifacts, records and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register for Historic Places criteria.

**Hydric Soils**- Soils indicative of wetland area, usually characterized by high organic contents that decay slowly due to lack of oxygen. They frequently contain zones of marked discoloration of varying types due to altered or changing oxygenation conditions.

**Hydrology**- The science of dealing with the study of water on the surface of the land, in the soil and underlying rocks and in the atmosphere.

**Hydrophytic (wetland) Vegetation**- Plants that are adapted to wet conditions. Willows, sedges and rushes are common hydrophytic plants.

**Hyporheic-** is a region beneath and lateral to the streambed, where there is mixing of shallow groundwater ad surface water. The flow dynamics and behavior in this zone (termed hyporheic flow) is recognized to be important for surface/groundwater interactions, as well as fish spawning, among other processes.

**Hypoxic-** reduced dissolved oxygen content of a body of water that is detrimental to aerobic organisms.

**Individual Tree Selection-** A stand management method in which the silviculturalist identified individual trees that need to be removed from a stand of trees. In these method specific types, sizes, or qualities of trees are identified for either removing from the stand or remaining in the stand.

**Initial Attack**- The fire suppression effort that takes place as soon as possible following a wildland fire report.

**Interdisciplinary Team**- A team of individuals with skills from different disciplines that focuses on the same task or project.

**Intermittent Stream**- A stream that goes dry at some point each year but flows continuously at least 30 days a year when it received water, usually from a seasonal groundwater, but may also include some surface source more persistent than a rainstorm, such as melting snow.

**Invasive Species**- A plant species moving into areas outside of its former range.

**Inventories Roadless Area**- (West of the 100$^{th}$ meridian). An area which meets the statutory definition of wilderness, does not contain improved roads maintained for travel by standard passenger type vehicle and meets one or more of the following criteria:

1. Contains 5,000 acres or more
2. Contains less than 5,000 acres but:
    a. Due to physiography or vegetation, is manageable in a natural condition
    b. Is a self-contained ecosystem such as an island
    c. Is contiguous to existing wilderness, primitive area, Administration-endorsed wilderness or roadless area in other Federal ownership, regardless of size.

**Irretrievable-** Applies to losses of production, harvest or commitment of renewable natural resources. For example, some of the timber production from an area is irretrievably lost during the time an area is

used as a winter sports site. If the use I changed, the timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

**Irreversible-** Applies primarily to the use of non-renewable resources, such as minerals or cultural resources or to those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

**Issue-** A point, matter or question of public discussion or interest to be addressed or decided through the planning process. *Preliminary issue* is an issue identified early in the scoping phase and is sometimes referred to as a tentative issue. *Significant issue* is an issue within the scope of the proposed action which is used to formulate alternatives in an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

**Jackstraw-**haphazardly arranged down logs of all sizes

**Ladder Fuels -** Fuels that provide vertical continuity between the ground fuels and tree crowns, thus creating a pathway for the surface fire to move into the overstory tree crowns.

**Legal Notice**- A notice of a decision which can be appealed that is published in the Federal Register or in the legal notice section of a newspaper or general circulation.

**Lek-** An area used habitually by grouse species where the males display for the females each spring. Number of males are counted on the lek each spring to estimate general population trends.

**Maintenance Level**- Defines the level of service provided by and maintenance required for a specific road, consistent with road management objectives and maintenance criteria. (FSH 7709.58, Sec 12.3-Transportation System Maintenance Handbook).

**Maintenance Level 1**- Assigned to intermittent service roads during times they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic maintenance strategies are ‘prohibit’ and ‘eliminate’. Roads receiving Level 1 maintenance may be of any type, class or construction standard and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at Level 1, they are closed to vehicular traffic, but maybe open and suitable for non-motorized uses.

**Maintenance Level 2-** Assigned to roads open for se by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either: 1) discourage or prohibit passenger cars or 2) accept or discourage high clearance vehicles.

**Maintenance Level 3**- Assigned to roads open and maintained for travel by prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either ‘encourage’ or ‘accept’. ‘Discourage’ or ‘prohibit’ strategies maybe employed for certain class of vehicles or users.

**Maintenance Level 4**- Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surface. However, some roads maybe single lane. Some roads maybe paved and/or dust abated. The most appropriate traffic management strategy is 'encourage'. However, 'prohibit' strategy may be apply to specific classes of vehicles or users at certain times.

**Maintenance Level 5**- Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double lane, paved facilities. Some maybe aggregate surfaced and dust abated. The most appropriate traffic management strategy is 'encourage'.

**Matrix**- The least fragmented, most continuous pattern element of a landscape; the vegetation type that is most continuous over a landscape.

**Mechanical Thinning**- Reducing the number of trees in a stand using a factor which is independent of tree quality. The use of spacing for thinning is one type of mechanical treatment. For example, the closest tree to the points of a 15'x 15' grid would be left, regardless of tree quality.

**Mesic**- Characterized by or adopted to a wet environment.

**Mitigation Measures**- Modifications of actions taken to:

1. Avoid impacts by not taking a certain action or parts of an action,
2. Minimize impacts by limiting the degree or magnitude of the action and its implementation;
3. Rectify impacts by repairing, rehabilitating or restoring the affected environment;
4. Reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or,
5. Compensate for impacts by replacing or providing substitute resources or environments.

**Mixed Use –** Roads on which both highway legal and non-highway legal vehicles are operating.

**Monitoring**- A process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

**Motor vehicle -** Any vehicle which is self-propelled, other than: (1) a vehicle operated on rails; and (2) any wheelchair or mobility device, including one that is batter-powered, that is designed solely for use by a mobility-impaired person for locomotion, and that is suitable for use in an indoor pedestrian area.

**Motor vehicle use map (MVUM)-** A map reflecting designated roads, trails, and areas on an administrative unit or a Ranger District of the National Forest System.

**Motorized Mixed Use**- Designation of a National Forest System (NFS) road for use by both highway-legal and non-highway legal motor vehicles (FSM Engineering 7700-30).

**Motorized Trail**-A route over 50 inches in width or a route over 50 inches wide that is identified and managed as a trail.

**National Environmental Policy Act (NEPA)-** An Act passed in 1969 to declare a national policy that encourages productive and enjoyable harmony between humankind and the environment, promotes efforts that prevent or eliminate damage to the environment and biosphere, stimulates the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, establishes a Council on Environmental Quality.

**National Forest Management Act-** A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring preparation of Forest Plans and the preparation of regulations to guide that development.

**National Forest System-** All National Forest land reserved or withdrawn from the public domain of the U.S.; all National Forest lands acquired through purchase, exchange, donation or other means; the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act; and all other lands. Waters, interests therein that are administered by the Forest Service or are designated for administration though the Forest Service as part of the system (36 CFR 212.1).

**National Forest System Road-** A forest road other than a road which has been authorized by a legally documented right-of-way held by State, county or other local public road authority.

**National Historic Preservation Act of 1966 (amended in 1992)-** is the primary federal law governing the preservation of historical and archaeological sites in the Unites States. This Act (signed into law October 15, 1966) created the National Register of Historic Places, the list of National Historic Landmarks, and the State Historic Preservation Offices.

**National Survey on Recreation and the Environment (NSRE)-** Part of the National Recreation Survey (NRS) program that was started in 1960

**National Forest Visitor Use Monitoring (NUVM)-** A permanent, ongoing sampling system which measures national forest visitor demographics, experiences, preferences and impressions. A stratified random sample is done for 25 percent of the national Forest system each year according to a national research protocol. NVUM responds to the need to better understand the use and importance, satisfaction with, national forest recreation opportunities.

**National Register of Historic Places-** A register of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology and culture. The register was established by the National Historic Preservation Act of 1966 and is maintained by the Secretary of the Interior.

**Native Species-** With respect to a particular ecosystem, a species that other than as a result of introduction, historically occurred or currently occurs in that ecosystem (Executive Order 13122, 2/3/99).

**Non-Motorized Travel**- Modes of travel include hiking, equestrian and mountain bikes and exclude all motorized use.

**Noxious Weeds (Invasive species)**- Non-native plants listed by the State that generally have either economic or ecosystem impacts, or are poisonous to wildlife and/or livestock. They aggressively invade disturbed areas such as fires, road slides, landslides and construction areas.

**Outstandingly Remarkable Values (ORV) -** A characteristic of rivers or sections of rivers in the national Wild and Scenic River System. In order for a river to be included in the system, it must possess at least one ‘outstandingly remarkable’ value, such as scenic, recreational, geologic, fish, wildlife, historic, cultural or other similar features. ORV’s are values or opportunities in a river corridor which are directly related to the river and which are rare, unique or exemplary from a regional or national perspective.

**Perennial -** A plant species having a life span of more than two years.

**Percentile Weather-** The weather conditions that can be expected of X% of days during the fire season. The standard percents are Low (0%-15%), Moderate (16%-89%), High (90%- 96%) and Extreme (97% +). So low percentile weather is the average suite of weather conditions that would occur less than 15% of the time.

**Prescribed Fire -** Fire which is planned and used as a tool to meet specific management objectives.

**Problem Fire-** Problem fires are wildfires that, because of extreme fire behavior, present a high risk to human safety and loss of forest resources

**Project Design Criteria (PDC)-** A set of required, implementation design criteria applied to projects to ensure that the project is done according to environmental standards ad adverse effects are within the scope of those predicted in this environmental impact statement.

**Proposed Species**- Any plant or animal species that is proposed by the Fish and Wildlife Service or NOAA Fisheries in the *Federal Register* notice to be listed as threatened or endangered.

**Ranger District-** An administrative subdivision of a national forest, supervised by a district ranger who reports to the forest supervisor.

**Recreation Opportunity Spectrum (ROS)-** A framework for stratifying and defining classes of outdoor recreation based on environments, activities and experience opportunities. The settings, activities and opportunities for obtaining experiences are arranged along a continuum or spectrum divided into seven classes: primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Roaded Modified, Rural and Urban.

**Recreational Rivers**- A classification within the national Wild and Scenic River System. Recreational rivers are those rivers, or sections of rivers, that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

**Reserved Rights-** Rights tribes kept, or reserved during the treaty-making out of a greater number of rights they already owned.

**Resolved Issue**- Significant issues identified by the public that have been fully mitigated during the development of alternatives or project design criteria.

**Restoration**- Ecological restoration is the process of assisting the recovery and management of ecological integrity. Ecological integrity includes a critical range of variability in biodiversity ecological processes and structures, regional and historical context and sustainable cultural practices.

**Revegetation**- The re-establishment of plants on a site. The term does not imply native or nonnative; does not imply that the site can ever support any other types of plants or species and is not at all concerned with how the site 'functions' as an ecosystem.

**Rill** – is a narrow and shallow incision into topsoil layers, resulting from erosion by overland flow or surface runoff that has been focused into a thin thread by soil surface roughness.

**Right-of-Way**- An accurately located strip of land with defined width, beginning of point and point of ending. It is the area within which the user has the authority to conduct operations approved or granted

by the landowner in an authorizing document, such as a permit, easement, lease, license or Memorandum of Understanding (MOU).

**Riparian Area**- A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it.

**Riparian Reserves**- Areas along live and intermittent streams, wetlands, ponds, lakes and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are important to the terrestrial ecosystem as well, serving as dispersal habitat for certain terrestrial species
.

**Road -** A motor vehicle route over 50 inches wide, unless identified and managed as a trail.

**Road Maintenance**- Maintaining or keeping an existing constructed road in an acceptable condition so as to continue to provide acceptable service and achieve its expected life (FSM 7712.3).

**Road Maintenance Objective-** defines the intended purpose of an individual road based on management area direction and access management objectives, Road management objectives contain design criteria, operations criteria and maintenance criteria (FSH 7709.55 Sec 33- Transportation Planning Handbook).

**Rotation-** A pre-determined time frame in which an even-aged forest stand would reach maturity and be harvested.

**Salvage-** Activity, usually removal or chipping, of material killed by a disturbance event such as insects, fire, wind etc. Where possible, this material is used as some form of forest product of commercial value, such as firewood, pulp, and/or chips.

**Scenic-** Of or relating to landscape scenery; pertaining to natural or natural-appearing scenery; constituting or affording pleasant views of natural landscape attributes or positive cultural elements.

**Scenic Integrity-** State of naturalness, or conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from existing landscape character in a National Forest.

**Scenic Quality**- the essential attributes of landscape that when viewed by people elicit psychological and physiological benefits to individuals and society as a whole.

**Scenic River-** A classification within the national Wild and Scenic River System. Scenic rivers are those rivers, or sections of rivers, that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible by roads.

**Seasonal Closures-** A route or area closed part of the year. The season of closure is defined by the reason for the closure (e.g. winter range, snow etc.).

**Sediment**- Any material carried in suspension by water that would ultimately settle to the bottom. Sediment has two main sources: from the channel area itself and from disturbed sites.

**Sensitive Species-** Species identified by the Regional Forester for which population variability is a concern, as evidenced by significant current or predicted downward trend in population numbers or density; or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

**Seral Stages**- Seral stages describe the phase of development of a plant community. Early seral species are those species you would expect to find on a site soon after a major disturbance, like fire. These are species such as pines, Douglas-fir, snowbrush, fireweed etc. They are generally shade intolerant species. Late seral are the species under a fully developed vegetative canopy, such as true firs, prince's pine, lichens etc.

**Shared use-** Locally derived term for mixed use routes that are designated to be component routes of the trail system.

**Silviculture**- The theory and practice of directing forest establishment, composition and growth for the production of forest resources to meet specific management objectives. The word is derived from the Latin word sylva, which means 'forest' and from cultura, which means 'to develop and care for.' So, it is the development and caring for the forest.

**Site**- A specific location where management activity is considered, planned or operating.

**Site Potential-** The specific ability of a site to grow vegetation. It includes soil, topographic, and climatic conditions that determine resources available for growing vegetation.

**Site preparation**- The removing or rearranging of vegetation or woody debris to meet specific management objectives. Most often it is used to describe the process(es) used to expose mineral soil areas suitable for planting or seeding desirable species of plants.

**Stand Dynamics**-The changes in forest stand structure with time, including stand behavior during and after disturbances (Oliver 1996).

**Stand Structure-** The physical and temporal distribution of trees and other plants in a stand (Oliver 1996).

**State Historic Preservation Office-** Established in 1967 to manage and administer programs for the protection of the state's historic and cultural resources.

**Subnivean-** Living beneath snow.

**Thinning**- Any cutting or removal of vegetation (trees, brush etc.) resulting in a reduction of competition for water, light, and/or nutrients between individual plants. Thinning is commonly referred to as commercial thinning and small tree thinning.

- **Commercial thinning** refers to removing material that has an established dollar value on the open market and can be sold with at least a minimal net value sufficient to pay for thinning activity.
- **Small tree thinning/Ladder fuel reduction** may or may not have a dollar value and usually includes the need to pay someone to accomplish the work. This is sometimes called small-tree thinning because the trees are smaller than sizes that have a commercial value.

**Thrifty Trees**-Trees which have at least 40 percent live crown ratio and with little or no evidence of disease or insects are called thrifty. They should also show evidence of good growth with long leaders and a good color, usually dark green.

**Travel Management Rule of 11/2/2005 (36 CFR parts 212, 251, 261 and 295)-** Regulations that directs each national forest in the country to designate roads, trails and areas that would be open to motor vehicle use by vehicle class. The result of this process would be a standardized map which designates roads and

trails that are open to motorized use. After a map is produced all other areas are closed to motorized use. The map would be updated annually. (*Referred to as the Final Travel Management Rule).*

**Trees per acre**-The amount of trees of a specific diameter on an acre of land.

**Tribe-** term used to designate a federally-recognized group of American Indians and their governing body. Tribes may be comprised of one or more Band.

**Tribal and Treaty Rights-** Native American treaty or other rights or interests recognized by treaties, statutes, laws, executive orders, or other government action, or federal court decisions.

**Treaty-** A contract or compact between nations. It is an agreement that is binding upon nations that sign the treaty.

**U.S. Fish and Wildlife Service (USFWS)-** The federal agency that is the listing authority for species other than marine mammals and anadromous fish under the ESA.

**U.S. Forest Service (USDA FS or USFS)-** The federal agency responsible for management of the nation's National Forest lands.

**Underburn-** Using prescribed fire under the canopy of an existing stand of trees.

**Undesirable Species-** Any species of plant or animal which is NOT considered to be compatible with meeting management goals and objectives.

**Ustic**- A soil moisture regime in which moisture is limited but is present at a time when conditions are suitable for plant growth.

**Viability-** Ability of a wildlife or plant population to maintain sufficient size to persist over time in spite of normal fluctuations in numbers**,** usually expressed as a probability of maintaining a specific population for a specified period.

**Viable Population**- A wildlife or plant population that contains an adequate number of reproductive individuals appropriately distributed on a planning area to ensure long-term existence of the species.

**Viewshed**- Total visible area from a single observer position, or total visible area from multiple observer positions. Viewsheds are accumulated seen-areas from highways, trails, campgrounds, towns, cities or other viewer locations. Examples are: corridor, feature, or basin viewsheds.

**Visual Quality Objective**- A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alteration of the characteristic landscape.

**Watershed-** A land area that contributes all its water to one drainage system, basin, stream, or river. Watersheds can be described at multiple levels.

**Wetland-** An area that is regularly saturated by surface or ground water and subsequently is characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include: swamps, bogs, fens, marshes and estuaries.

**Wild and Scenic River System-** The Wild and Scenic Rivers Act of 1968 established a system of selected rivers in the United States, which possess outstanding remarkable values, to be preserved in a

free-flowing condition. Within the national system of rivers, three classifications define the general character of designated rivers: Wild, Scenic and Recreational. Classifications reflect levels of development and natural conditions along a stretch of river. Classifications are used to help develop management goals for the river.

**Wilderness-** Areas designated by Congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; including at least 5,000 acres, or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecological and geologic interest.

**Wildland Fire-** Any non-structure fire that occurs in the wildland. There are three types of wildland fire: wildfire, wildland fire use and prescribed fire.

**Wildfire**- An unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland ire where the objective is to put the fire out.

**Winter Range-** A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually better defined and smaller than summer range.

**Woody Debris**- Dead pieces of woody vegetation such as stems, limbs, or leaves which are on a site.

**Xeric-** A soil moisture regime in which soil is dry for 45 or more consecutive days in the 4 months following the summer solstice, and moist for 45 or more consecutive days in the 4 months following the winter solstice.

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# Appendices

# Appendix A – Consistency with Current Laws and Management Direction

## Effects on Laws, Regulations, Plans, Policies, and Procedures

The National Environmental Policy Act at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders." This section includes a brief summary of those laws, policies, and executive orders that are relevant to the proposed actions considered in this EIS.

**The American Antiquities Act of 1906**

This Act makes it illegal to appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument or any object of antiquity, situated on lands owned by the Government of the United States, without permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated.

**Multiple-Use Sustained –Yield Act of 1960**

The Multiple-Use Sustained Yield Act of 1960 requires the Forest Service to manage National Forest Systems lands for multiple use (including timber, recreation, fish and wildlife, range, and watershed). All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be re-established and grown again if the productivity of the land is not impaired.

All lands proposed for active management in the Rim-Paunina analysis are classified "suitable." Actions proposed comply with LRMP standards and guidelines SL-3 and SL-4, and Regional policy (FSM 2520, R-6 Supplement No. 2500-98-1) for maintaining soil productivity (Chapter 3, Soil Quality).

**The National Historic Preservation Act of 1966, as amended**

This Act requires Federal agencies to consult with American Indian Tribes, State and local groups before nonrenewable cultural resources, such as archaeological and historic structures, are damaged or are destroyed. Section 106 of this Act requires Federal agencies to review the effects proposed projects may have on the cultural resources of the analysis area.

Following guidelines in a 2003 Regional Programmatic Agreement (PA) among USDA-Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Office (SHPO), a finding of "*Historic Properties Avoided*" was determined under Stipulation III(B)2 of the PA. The Forest finds that there are historic properties but the undertaking will have no effect on them as defined by 36 CFR 800.16(i).

**The National Environmental Policy Act (NEPA) of 1969, as amended**

The purposes of this Act are "To declare a national policy which would encourage productive and enjoyable harmony between man and his environment, to promote efforts which would prevent or eliminate damaged to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nations; and to establish a Council on Environmental Quality" (42 U.S.C. Sec. 4321). The law further states "it is the continuing policy of the Federal Government, in cooperation, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony,

and fulfill the social, economic and other requirements of the present and future generations of Americans. This law essentially pertains to public participation, environmental analysis, and documentation.

The Rim-Paunina project followed the format and content requirements of environmental analysis and documentation. The entire process of preparing this environmental impact statement was undertaken to comply with NEPA. Cumulative effects were assessed and displayed where they occur in the manner most informative and logical to display. Also, the depth of analysis was tailored to the degree of effect. Therefore, a brief discussion is most useful to decision makers and the public to reduce paperwork and the accumulation of extraneous background data and to emphasize real environmental issues and alternatives (CEQ, 1500.2b). In many instances within this analysis, past and present activities, including timber sales, were included in the existing condition. Foreseeable actions were also addressed if there was a proposed action and if it is in the public domain.

**The National Forest Management Act (NFMA)**
The regulations in this subpart set forth a process for developing, adopting, and revising land and resource management plans for the National Forest System as required by the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended (hereafter, RPA). These regulations prescribe how land and resource management planning is to be conducted on National Forest System lands. The resulting plans shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long term net public benefits in an environmentally sound manner

The Rim-Paunina Project followed the 1982 planning rule and specifically in the proposed amendments of the Deschutes National Forest Land and Resource Management Plan. The Rim-Paunina project activities are consistent with the Deschutes Land and Resource Management Plan and the associated amendments for Late Successional Reserves, Old Growth, and General Forest including the Eastside Screens, as displayed in Chapter 3 and Appendix A. The Rim-Paunina project is outside the Northwest Forest Plan zone of influence.

## Endangered Species Act
Effects to Threatened, Endangered species are evaluated in the Fisheries, Native Plants, and Wildlife sections of Chapter 3 of this EIS. The Endangered Species Act of 1973 requires that actions of federal agencies do not jeopardize or adversely modify critical habitat of federally-listed species. A Biological Evaluation has been completed for threatened, endangered, and sensitive fish, plant, and terrestrial species.

The purposes of this Act are to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered and threatened species, and to take such steps as may be appropriate to achieve the purpose of the treaties and conventions set forth in subsection (a) of this section." The Act also states "It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."

Alternatives B, C, D, and E would have **"No Effect"** the northern spotted owl and northern spotted owl critical habitat. Alternatives B, C, D, and E would have **"No Impact"** on the Oregon spotted frog and California wolverine. Alternatives B, C, D, and E would result in a determination of **"May Impact Individuals or Habitat, But Would Not Likely Contribute to a Trend Toward Federal Listing or Loss of Viability to the Population or Species"** for the Pacific fisher.

**The Clean Air Act, as amended in 1990**
The purposes of this Act are "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population; to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution; to provide technical and financial assistance to state and local governments in connection with the development and execution of their air pollution prevention and control programs; and to encourage and assist the development and operation of regional air pollution prevention and control programs."

### Clean Water Act
The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of all waters to protect the beneficial uses as documented according to Oregon Department of Environmental Quality (ODEQ) criteria. A beneficial use is a resource or activity that would be directly affected by a change in water quality or quantity and are defined on a basin scale in the Oregon Administrative Rules for water quality.

Action alternatives follow State of Oregon requirements in accordance with the Clean Water Act for protection of waters. Application of Best Management Practices (BMPs) are selected and designed on site-specific conditions for waters potentially affected in the Rim-Paunina analysis area. The interdisciplinary team has reviewed and incorporated applicable BMP water quality objectives in the design of alternatives and their mitigation measures. Standards and Guidelines for the Inland Native Fish Strategy where developed (in part) to maintain and restore aquatic ecosystems for dependent species (Chapter 3, Fisheries and Aquatics). These standards and guidelines afford the same or greater protection of stream courses as direction found in the 1988 USDA publication "General Water Quality – Best Management Practices

Under Section 319 of the 1987 Clean Water Act Amendments, states are required to determine those waters that would not meet the goals of the Clean Water Act, determine those non-point source activities that are contributing pollution, and develop a process on how to reduce such pollution to the "maximum extent practicable." Section 303(d) of the Clean Water Act requires that a list be developed of all impaired or threatened waters within each state. The ODEQ is responsible for compiling the 303(d) list, assessing data, and submitting the 303(d) list to the Environmental Protection Agency (EPA) for federal approval.

There are no perennial or fish-bearing streams or waterbodies within the Rim-Paunina Project area. There is no threatened, proposed, candidate, or sensitive aquatic species or their habitat within the Rim-Paunina planning area. There are no 303(d) listed water bodies in the Rim-Paunina planning area.

### Executive Orders

### 11988 & 11990 of May 24, 1977

### Protection of Floodplains and Wetlands
Executive Order 11988 requires the Forest Service to provide leadership and to take action to (1) minimize adverse impacts associated with occupancy and modification of floodplains and reduce risks of flood loss, (2) minimize impacts of floods on human safety, health, and welfare, and (3) restore and preserve the natural and beneficial values served by floodplains. Executive Order 11990 requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

All alternatives comply with the intent of Executive Order 11990 and USDA Departmental Regulation 9500-3. See discussions related to this topic in Hydrology, Fisheries, and Soil resource sections in Chapter 3 for more information.

### 12898 of February 11, 1994

### Environmental Justice in Minority Populations and Low-income Populations

Executive Order 12898 directs the agency to identify and address, "...as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations...." The intent of the order is to assure the fair treatment and meaningful involvement and consideration of all people. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from the execution of a federal actions. Outreach and public involvement for this project has been extensive and at various scales within various communities of interest (Chapter 1, Public Participation)

The subsets of the general population include ethnic minorities, people with disabilities, the elderly, and low-income groups. Environmental Justice is defined as the pursuit of equal justice and protection under the law for all environmental statutes and regulations, without discrimination based on race, ethnicity, or socioeconomic status. The minority and low income population groups living in counties surrounding the project area work in diverse occupations. Some minorities, low income residents, and Native Americans may rely on forest products or related forest activities for their livelihood. This is especially true for those individuals that most likely reside in the rural communities adjacent to National Forest Lands, such as La Pine, Crescent, and Gilchrist, Oregon.

The no action alternative would continue the local economic situation as described in the section titled Social-Economics. Opportunities for employment of minority and low income workers may arise through contract activities for various forest work such as thinning, hand piling, and various small business contracts related to work outside the project area, but there are no known disproportionately high effects to any ethnic minorities, people with disabilities, and low-income groups.

Under all action alternatives there would be no known adverse effects that would be disproportionately high to any ethnic minorities, people with disabilities, and low-income groups as a result of implementation of any action alternative in the Rim-Paunina project. Within the social context presented, the action alternatives developed for this project have the potential to bring in workers from the outside to perform logging and post harvest activities such as small tree thinning and hand piling. While the outside workforce is more likely to be racially diverse than the local resident population, the residents have worked effectively with and supported anticipated fluctuations in the workforce expected with the implementation of an action-based alternative. The primary services needed by the workers would be food and shelter. Local businesses that can supply food (grocery stores and restaurants) and other services would capture most of the money being spent by the workers in the area. Since these businesses have supported similar workforces in the past, capitol expansion would probably not be required.

As a result of outreach and scoping (public involvement) processes, there were no potentially disproportionately high and adverse human-health, environmental, or social effects to minority or low-income populations identified. Based on the social and economic analysis presented in Chapter 3, there is no known potential for disparate or disproportionate effects on minority or low-income populations.

There would be no change to how people recreate within the project area (Recreation, Chapter 3).

**Forest Order 12962 (Aquatic systems and recreational fisheries)**
This 1995 order's purpose is to conserve, restore, and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide. It requires federal agencies to evaluate the effects of federally funded actions on aquatic systems and document those effects relative to the purpose of this order. There are no perennial or fish-bearing streams or waterbodies within the Rim-Paunina planning area. Reference Aquatic Resources, Chapter 3 for more detail.

**Executive Order 13112 (Invasive species)**
This 1999 order requires Federal agencies whose actions may affect the status of invasive species to identify those actions and within budgetary limits: "(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species… (iii) monitor invasive species populations… (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded;…(vi) promote public education on invasive species… and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species… unless, pursuant to guidelines that it has prescribed, the agency had determined and made public… that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm would be taken in conjunction with the actions."

There is a low to high risk for spreading or introducing noxious weeds for all action alternatives in this project. The risk is proportional to the area of ground disturbance and miles of roads used in each action alternative. Highest risk is for the Action Alternatives (B through E) with a low risk for Alternative A. Weeds are already present in the analysis area, along Highways 58 and 97. There is one known historic bull thistle site within activity unit 775 where infestation is no longer present, but the site is monitored annually. The Region 6 Invasive Plant Final Environmental Impact Statement (FEIS) Record of Decision (ROD) (USDA Forest Service, 2005) adopted Standards and Guidelines that would be followed (Chapter 3, Invasive Plants).

## 13186 of January 10, 2001, and the Migratory Bird Treaty Act

**The Migratory Bird Treaty Act of 1918**
The purpose of this Act is to establish an international framework for the protection and conservation of migratory birds. The Act makes it illegal, unless permitted by regulations, to "pursue, hunt, take, capture, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, including in this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird" (16 USC 703). The original 1918 statute implemented the 1916 Convention between the United States and Great Britain (for Canada). Later amendments implemented treaties between the United States and Mexico, Japan, and the Soviet Union (now Russia).

## Responsibilities of Federal Agencies to Protect Migratory Birds

Executive Order 13186, signed January 10, 2001, directs federal agencies to protect migratory birds by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practical, adverse impacts on migratory birds' resources when conducting agency actions. This order directs agencies to further comply with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and other pertinent statutes. This analysis is compliant with the National Memorandum of Understanding between the USDA Forest Service and the U.S. Fish and Wildlife Service to promote the conservation of migratory birds (USDA 2008g).

The Rim-Paunina project area is not expected to result in any additive effects to the Golden Eagle because they are not known to nest in the project area and habitat is limited. There are no overlapping project in the Rim-Paunina analysis area, thus there would be no cumulative effects.

For the Bald Eagle there are no known nests, roosts, nor any designated Bald Eagle Management Areas (BEMAs) within the Rim-Paunina project area. The closest BEMA is approximately 10 miles to northwest of the project area. The combination of actions proposed would result in a determination of **"No Impact"** to the bald eagle and consequently, there would also be no cumulative effects.

For a more detailed analysis see Wildlife- TES and MIS sections in Chapter 3.

### Facilitation of Hunting Heritage and Wildlife Conservation

This order directs federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

This DEIS and the associated specialist reports have considered the management of wildlife habitats trends in and effects on hunting opportunities, and economic and recreational values of hunting. Resource specialists have considered the programs and plans of other state and federal wildlife agencies, have worked collaboratively with them in their professional roles, and have coordinated with them in development of Rim-Paunina project. These other agencies have been kept abreast of these proposed actions. The Deschutes National Forest currently has in place various cooperative seasonal motorized use closures, including winter range motorized closure areas and the so-called "Green Dot" hunting season road closures.

**Executive Order 13443 (Hunting opportunities)**

Executive Order 13443 was signed by President Bush on August 13, 2007 and is intended to enhance hunting opportunities on federal public lands. The stated purpose of the Executive Order is to "…direct federal agencies that have programs and activities that have a measureable effect on public land management, outdoor recreation, and wildlife management, including the department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitats." Hunting opportunities are disclosed in Chapter 3, Recreation and Wildlife- Big Game.

# Management Direction

## Deschutes National Forest Land and Resource Management Plan

The 1990 Deschutes National Forest Land and Resource Management Plan (Forest Plan), as amended, guides all natural resource management activities and provides standards and guidelines for the Deschutes National Forest. The Standards and Guidelines apply where the amendments (Northwest Forest Plan and revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales) provide no particular guidance or where the Forest Plan provides more restrictive direction than that found in the amendment.

The Deschutes National Forest Land and Resource Management Plan (Forest Plan; page 4-2) contains three Forest Management Goals that are particularly relevant to this project:

1. Maintain and enhance vigor of the forest ecosystem through the control of forest pests.
2. Provide old-growth tree stands for (1) preservation of natural genetic pools, (2) habitat for plants and wildlife species associated with over-mature tree stands, (3) contributions to the diversity spectrum, (4) aesthetic appeal.
3. Provide an optimum level of timber production consistent with various resource objectives, environmental constraints, and economic efficiency.

All alternatives considered in detail in this EIS are consistent with the Deschutes National Forest Plan. The following Forest Plan Management Areas are found in the project area: Old Growth Management, General Forest, and Scenic Views (see Figure 67).

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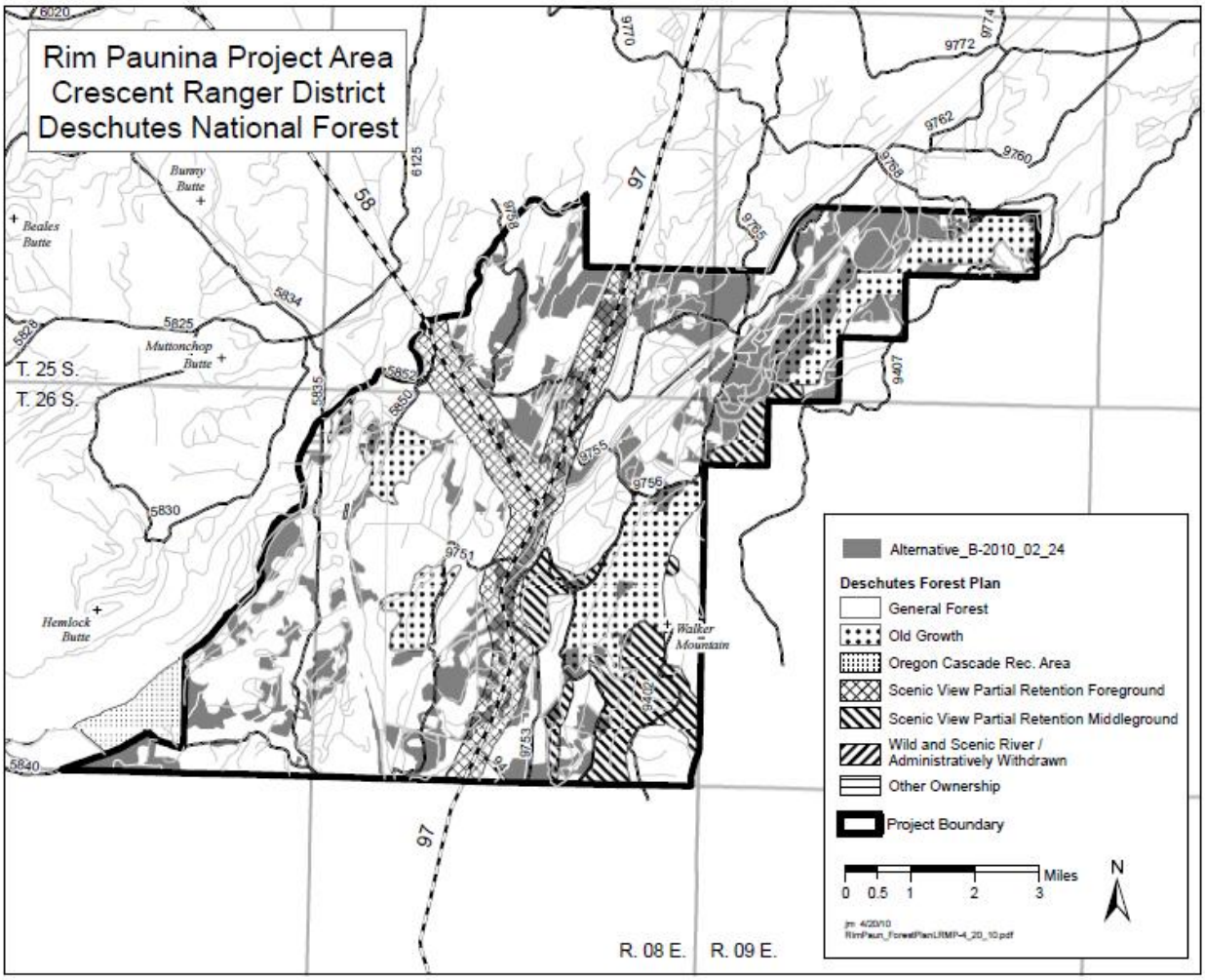


**Figure 67. Deschutes National Forest Land and Resource Management Plan Allocations within the Rim-Paunina Project Area**

***M8: General Forest (28,344 acres)*** – This Management Area emphasizes timber production while providing forage production, visual quality, wildlife habitat, and recreational opportunities for public use and enjoyment. While adhering to the Eastside Screens these are the areas of the Forest Plan where a broad spectrum of goods and services would be available to contribute to the local and regional economic well-being.

***M9: Scenic Views (6,844 acres)*** – The goal of Scenic Views management areas is to provide high quality scenery that represents the natural character of Central Oregon. Landscapes seen from selected travel routes and use areas would be managed to maintain or enhance their appearance. To the casual observer, results of activities either would not be evident, or would be visually subordinate to the natural landscape.

All activities planned in Alternatives B, C, D, and E are consistent with Goals, Objectives, and Standards and Guidelines in the Deschutes National Forest Plan because in Foreground areas, all activities are designed and located to blend into the natural landscape and are not visually apparent to the casual forest visitor (High Scenic Integrity). Also in Partial Retention, activities remain subordinate to the natural landscape (Medium Scenic Integrity). There is a Forest Plan Amendment to allow prescribed burning in

Scenic Views in an area larger than five acres. For more information, reference the Scenic Quality and Other Disclosures sections in Chapter 3.

***M15: Old Growth (5,043 acres)*** – The goal of this Management Area (MA) is to provide naturally evolved old growth forest ecosystems for the following purposes: habitat for plant and animal species associated with old growth forest ecosystems; representations of landscape ecology; public enjoyment of large, old-tree environments; and the needs of the public from an aesthetic spiritual sense. There are five designated old growth areas within the project area.

***Management Indicator Species*** – This is not a specific management area; however, the Deschutes LRMP identifies a group of wildlife species as management indicator species (MIS). These species were selected because their welfare could be used as an indicator of other species dependent upon similar habitat conditions. The species selected for the Deschutes National Forest include the Red-tail hawk, golden eagle, osprey, peregrine falcon, northern bald eagle, northern spotted owl, northern goshawk, Cooper's hawk, sharp-shinned hawk, three-toed woodpecker, American marten, osprey, woodpeckers, great gray owl, great blue heron, waterfowl, wolverine, elk, mule deer, Townsend big-eared bat, species associated with logs and down woody debris, and species associated with various plant communities and successional stages. Reference the MIS section in Chapter 3 for a detailed analysis.

***Inventories Roadless Areas*** – The analysis area does not contain any Inventoried Roadless Areas. The western boundary of activity abuts the Oregon Cascades Recreation Area, which may be considered unroaded for large portions. The closest designated Inventoried Roadless Areas are the Mt. Thielsen IRA approximately four miles to the southwest of the project area on the Fremont-Winema National Forests and the Maiden Peak IRA on the Deschutes National Forest approximately 15 miles to the northwest of the Rim-Paunina project area.

***Other Ownership (106 acres)*** – Consisting of private landowners in two areas in the Rim-Paunina project area.

***Wilderness*** – This is not a specific management area however, the Deschutes Land and Resource Management Plan (LRMP) identified in Appendix A all the Wildernesses in the Deschutes National Forest. The very western edge of activity is over a mile from the Mt. Thielsen Wilderness Area. There is no wilderness in the Rim-Paunina Project area.

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# Appendix B

## Standards and Guidelines and Best Management Practices for Protection of Soil and Water Quality

The following Deschutes National Forest Standards and Guidelines and Best Management Practices (BMPs) are applicable to the sites in the analysis area where management activities are proposed. These Standards and Guidelines and BMPs would protect soil productivity, maintain slope stability and all stream courses would be protected. All levels of instream large woody material would not change and would be protected. There are no harvest units proposed within Riparian Habitat Conservation Areas.

**Deschutes National Forest Standards and Guidelines**

- **SL-1** Soil Productivity "Land management activities shall be planned and conducted to maintain or enhance soil productivity and stability."
- **SL-3** Leave a minimum of 80 percent of an activity area in a condition of acceptable productivity potential for trees and other managed vegetation following land management activities. Including all system roads, landing, spur roads, and skid roads.
- **SL-4** Any sites where this direction cannot be met will require rehabilitation. Applicable Best Management Practices include T-9 and T-11.
- **SL-5** The use of mechanical equipment in sensitive soil areas will be regulated to protect the soil resource. Operations will be restricted to existing trails and roads when feasible.
- **SL-6**, which provides ground cover objectives to minimize accelerated erosion rates on disturbed sites with unprotected soils.

Guidelines (FSM 2500, R-6 supplement 2500-98-1) describe conditions detrimental to soil productivity and outlines Soil Quality Standards to limit the extent of these conditions to less than 20 percent of an activity area. Detrimental soil conditions are described in the Soil Quality Standards as follows:

- Detrimental soil compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent or greater over the undisturbed level.
- Detrimental puddling occurs when the depth of ruts or imprints is six inches or greater.
- Detrimental displacement is the removal of more than 50 percent of the A horizon from an area greater than 100 (10' x 10') square feet and at least 5 feet in width.
- Detrimental burn damage requires significant color change of the mineral soil surface in an area greater than 100 (10' x 10') square feet to an oxidized reddish color, with the next one-half inch below blackened from organic matter charring as a result of heat conducted from the fire.
- Detrimental erosion requires visual evidence of surface loss over an area greater than 100 (10' x 10') square feet, rills or gullies, and/or water quality degradation from sediment or nutrient enrichment.

Under Alternatives B, C, D, and E, the amount of disturbed soil associated with log landings and skid trails would be limited to the minimum necessary to achieve management objectives. Project Design Features, management requirements, and Best Management Practices (BMPs) built into the alternatives are all designed to avoid or minimize potentially adverse impacts to the soil resource. Compliance with LRMP standard and guideline SL-5 (LRMP 4-70) is addressed by using advanced logging systems on slopes greater than 30 percent, restricting numbers of equipment passes, using existing harvest transportation systems, and seasonal restrictions on wet areas. 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 would be implemented during and following project activities to meet the stated

objectives for protecting and maintaining soil productivity. The Ranger District and Forest has had success using these practices and is assured they can be implemented by contract provision.

Under Alternative B, detrimental soil conditions would remain on 1,196 acres, followed by 1,163 acres in Alternative C; 1,160 acres in Alternative D; and 1,329 acres in Alternative E. These estimates are very conservative. All actives would be consistent with Forest and Regional standards and guidelines for soil productivity with no units that exceed the 20 percent disturbance standards (Tables 71-74 Appendix C). It is expected that enough fallen trees and other organic materials would be available after harvest activities to meet recommended guidelines for coarse woody debris retention in the short-term. Therefore, the proposed actions comply with Regional and LRMP standards and guidelines for maintaining soil productivity within all proposed activity areas without restoration (subsoiling).

**Best Management Practices Applied in the Rim-Paunina Analysis Area**
Best Management Practices were utilized in designing the proposed activities in the Rim-Paunina analysis area, with the following requirements in place:

1. Select and design BMPs based on site-specific conditions, technical and economic feasibility, and water quality standards for those waters potentially impacted.
2. Implement and enforce BMPs.
3. Monitor BMPs to ensure correct application and effectiveness as designed in attaining water quality standards.
4. Mitigate to minimize impacts caused by activities when BMPs do not perform as expected.
5. Adjust BMPs when there is evidence that beneficial uses are not protected and water quality standards are not achieved. Evaluate the adequacy of water quality criteria for assuring protection of beneficial uses. Recommend adjustments to water quality standards as appropriate."

**Timber Harvest Best Management Practices:**

- **T-2 Title:** Timber Harvest Unit Design
  *Objective*: To ensure that timber harvest unit design will create favorable conditions of water flow, water quality, and fish habitat.
- **T-3 Title:** Use of Erosion Potentials Assessment for Timber Harvest Design.
  *Objective*: To prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.
- **T-4 Title:** Use of Sale Area Maps for Designating Water Quality Protection Needs.
  *Objective*: To delineate location of protection areas and available water sources as a guide for both the Purchaser and the Sale Administration.
- **T-5 Title:** Limiting the Operating Period of Timber Sale Activities.
  *Objective*: To ensure that the purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract.
- **T-6 Title:** Protection of Unstable Lands
  *Objective*: To provide for identification and appropriate management prescription for unstable lands.
- **T-7 Title:** Streamside Management Unit Designation
  *Objective*: To designate a riparian area or zone along streams and wetlands where prescriptions are made that will minimize potential effects from logging and related land disturbance activities on water quality and beneficial uses.
- **T-8 Title:** Stream Course Protection
  *Objectives*: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow and (3) to prevent sediment and pollutants from entering streams.
- **T-10 Title:** Log Landing Location.

*Objective*: To located landings in such a way as to minimize creation of hazardous watershed condition.

- **T-12 Title:** Suspended Log Yarding in Timber Harvest.
  *Objectives*: 1. To protect soils from excessive disturbance, and 2. Maintain the integrity of the Riparian Reserve Areas and other sensitive areas.
- **T-13 Title:** Erosion Prevention and Control Measures During Timber Sale Operations.
  *Objective*: To ensure the Purchaser's operations shall be conducted to minimize soil erosion.
- **T-14 Title:** Revegetation of Areas Disturbed by Harvest Activities.
  *Objective*: To establish a vegetation cover on disturbed sites and to prevent erosion and sedimentation.
- **T-15 Title:** Log Landing Erosion Prevention and Control.
  *Objective*: To reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigation measures.
- **T-18 Title:** Erosion Control Structure Maintenance.
  *Objective*: To ensure that the constructed erosion control structures are stabilized and working.
- **T-19 Title**: Acceptance of Timber Sale Erosion Control measures Before Sale Closure.
  *Objective*: To assure the adequacy of required erosion control work on timber sales.
- **T-22 Title:** Modification of the Timber Sale Contract.
  *Objective*: To modify the Timber Sale Contract if new circumstances or conditions arise and indicate that the timber sale will irreversibly damage soil, water or watershed values.

**Road System Best Management Practices:**

- **R-1 Title:** Guidelines for the Location and Design of Roads.
  *Objective*: To located and design roads with minimal resource damage.
- **R-2 Title:** Erosion Control Plan
  *Objective*: To limit and mitigate erosion and sedimentation through effective planning prior to initiation of road constructions activities and through effective contract administration during construction.
- **R-3 Title:** Timing of Construction Activities.
  *Objection*: To minimize erosion by conducting road construction operation during minimal runoff periods.
- **R-6 Title:** Dispersion of Subsurface Drainage Associated with Roads.
  *Objective*: To minimize the possibilities of roadbed and cut or fill slope failure and subsequent production of sediment:
- **R-9 Title:** Timely Erosion Control Measures on in completed Roads and Stream Crossing.
  *Objective*: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.
- **R-13 Title:** Diversion of Flow Around Construction Sites
  *Objective*: (1) To ensure all stream diversion are carefully planned, (2) to minimize downstream sedimentation, (3) to restore stream channels to their natural grade, condition, and alignment as soon as possible.
- **R-18 Title:** Maintenance of Roads.
  *Objective*: To maintain roads in a manner which provides for water quality protection by controlling the placement of waste material, keeping drainage facilities open, and by repairing ruts and failures to reduce sedimentation and erosion.

**Prescribe Fire Best Management Practices**

- **F-2 Title**: Consideration of Water Quality in Formulating Prescribed Fire Prescriptions.
  *Objective*: To provide for water quality protection while achieving the management objectives through the use of prescribed fire.
- **F-3 Title:** Protection of Water Quality during Prescribed Fire Operations.
  *Objectives*: To maintain soil productivity.

These Best Management Practices (BMPs) are the closest match for the roads and designated trails and would be used to design proposed activity area in the Rim-Paunina project area.

Promote and apply approved best management practices, as described in General Water Quality Best Management Practices (USDA FS 1988), to all management activities as the method for control of non-point sources of water pollution, and for compliance with established state or national water quality goals (USDA FS 1984). The Deschutes Forest Plan states that BMPs will be selected and designed into project plans in accordance with the Clean Water Act for protection of waters of the State of Oregon (Forest Plan 4-69).

Specific BMPs commonly used to minimize the effects of road systems, fuels and timber management activities on the water resource are briefly described for this project proposal.

- Water quality objectives are established prior to preparation of the burn plan to provide for water quality protection while achieving the management objectives through the use of prescribed fire (LRMP RP-35; Fuels Management BMP F-2 and F-3).
  - Water diversions on fire lines will be constructed to drain water into areas with sufficient ground cover to avoid sediment transport to stream channels.
  - A protective strip of undisturbed ground surface will be provided between prescribed burn areas and riparian transitional areas if sediment movement to stream channels is likely.
- Road and trail maintenance shall be performed on a frequency necessary to maintain drainage efficiency at all runoff control and drainage structures, e.g., dips and culverts. Road management objectives shall include direction to minimize soil erosion. Dispersal of runoff can reduce peak downstream flows and keep water in its natural drainage area (LRMP RP-22 and RP-23; Road Systems BMP R-7 and R-18 thru R-20; Timber Management BMP T-7 and T-8).
  - Forest Service road 1170-400 crosses an unnamed intermittent stream and will require immediate maintenance to minimize the erosive effects of water, disperse runoff from or through this road, and too minimize the sediment generated from this road. A number of measures can be used, alone or in combination, to minimize possible detrimental effects of surface drainage. Dispersal of runoff from roads can be accomplished by rolling the grade, insloping with cross drains, outsloping, crowning, installation of water spreading ditches, contour trenching, etc.
- Opportunities to relocate, close, or obliterate existing roads in riparian areas shall be pursued (LRMP RP-24; Road Systems BMP R-23).
  - Forest Service roads 1170-900, 1100-980, 1129-874, 1129-875, and 1129-876 have been identified for decommissioning and/or closure. Any road being closed and/or decommissioned shall have sufficient drainage to provide for hydrologic function and reduce sedimentation.
- There will be no scheduled timber harvest in the Riparian Habitat Conservation Areas (RHCAs). (LRMP RP-11; Timber Management BMP T-7, T-8, T-10, T-11, T-13, T-15, T-21).
  - Determination of RHCA size and/or width is in accordance with RHCA standards and guidelines (Table 2).

- Use sale area maps for designating water quality protection needs (Timber Management BMP T-4).
    - The following features shall be designated on the sale area map, which is an integral part of the timber sale contract:
        a. Location of stream courses to be protected
        b. Wetlands (meadows, lakes, bogs, etc.), if any, to be protected
        c. Boundaries of harvest units
        d. Specified roads
        e. Roads where log hauling is prohibited or restricted
        f. Structural improvements
        g. Areas for different skidding, felling, and yarding methods
        h. Sources of rock for road work, riprapping, etc.

# Appendix C - Soils

Appendix C displays existing and predicted amounts of detrimental soil conditions for each of the individual activity areas planned for mechanical vegetation, fuel reduction, and soil restoration treatments under all of the action alternatives.

**Table 136. Alternative B: Estimates of Detrimental Soil Conditions following Mechanical Harvest by Activity Areas**

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[50] |
|---|---|---|---|---|---|---|
| 5 | HTH | 77 | 4.6 | 6% | 7.7 | 10% |
| 6 | HIM | 20 | 2.0 | 10% | 2.7 | 14% |
| 10 | HTH | 7 | 0.7 | 10% | 1.0 | 14% |
| 15 | HIM | 16 | 1.3 | 8% | 1.9 | 12% |
| 20 | HIM | 30 | 3.0 | 10% | 4.2 | 14% |
| 25 | HTH | 306 | 12.2 | 4% | 24.5 | 8% |
| 30 | HIM | 57 | 3.4 | 6% | 5.7 | 10% |
| 35 | HIM | 137 | 5.5 | 4% | 11.0 | 8% |
| 40 | HIM | 197 | 7.9 | 4% | 15.8 | 8% |
| 45 | HIM | 70 | 7.0 | 10% | 9.9 | 14% |
| 50 | HIM | 17 | 1.7 | 10% | 2.4 | 14% |
| 55 | HIM | 31 | 1.8 | 6% | 3.1 | 10% |
| 60 | HIM | 95 | 3.8 | 4% | 7.6 | 8% |
| 65 | HIM | 17 | 1.4 | 8% | 2.0 | 12% |
| 70 | HTH | 176 | 10.5 | 6% | 17.6 | 10% |
| 75 | HTH | 38 | 2.3 | 6% | 3.8 | 10% |
| 80 | HIM | 48 | 3.9 | 8% | 5.8 | 12% |
| 85 | HTH | 29 | 2.3 | 8% | 3.5 | 12% |
| 90 | HIM | 47 | 4.7 | 10% | 6.6 | 14% |
| 95 | HTH | 74 | 3.0 | 4% | 6.0 | 8% |
| 110 | HIM | 28 | 1.1 | 4% | 2.3 | 8% |
| 115 | HTH | 18 | 1.5 | 8% | 2.2 | 12% |
| 120 | HTH | 70 | 7.0 | 10% | 9.7 | 14% |
| 125 | HIM | 31 | 1.2 | 4% | 2.4 | 8% |
| 130 | HIM | 184 | 11.1 | 6% | 18.4 | 10% |
| 135 | HIM | 34 | 1.4 | 4% | 2.7 | 8% |

[50] All Activities includes: biomass removal (firewood, post and poles etc.), prescribed burning, post sale fuel reduction activities and pile disposal.

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[50] |
|---|---|---|---|---|---|---|
| 140 | HIM | 55 | 2.2 | 4% | 4.4 | 8% |
| 145 | HTH | 18 | 0.7 | 4% | 1.4 | 8% |
| 150 | HIM | 53 | 5.3 | 10% | 7.5 | 14% |
| 155 | HIM | 13 | 0.8 | 6% | 1.3 | 10% |
| 160 | HTH | 9 | 0.4 | 4% | 0.7 | 8% |
| 165 | HIM | 15 | 0.9 | 6% | 1.5 | 10% |
| 166 | HIM | 7 | 0.4 | 6% | 0.7 | 10% |
| 167 | HIM | 4 | 0.3 | 6% | 0.4 | 10% |
| 170 | HIM | 26 | 1.6 | 6% | 2.6 | 10% |
| 171 | HIM | 22 | 0.9 | 4% | 1.8 | 8% |
| 180 | HTH | 113 | 9.0 | 8% | 13.5 | 12% |
| 185 | HTH | 24 | 1.5 | 6% | 2.4 | 10% |
| 190 | HTH | 22 | 1.3 | 6% | 2.2 | 10% |
| 195 | HTH | 82 | 6.5 | 8% | 9.8 | 12% |
| 200 | HTH | 10 | 0.4 | 4% | 0.8 | 8% |
| 205 | HTH | 50 | 2.0 | 4% | 4.0 | 8% |
| 215 | HIM | 15 | 0.6 | 4% | 1.2 | 8% |
| 220 | HIM | 23 | 0.9 | 4% | 1.9 | 8% |
| 225 | HIM | 65 | 5.2 | 8% | 7.8 | 12% |
| 235 | HIM | 52 | 4.1 | 8% | 6.2 | 12% |
| 240 | HIM | 250 | 10.0 | 4% | 20.0 | 8% |
| 245 | HIM | 24 | 2.4 | 10% | 3.4 | 14% |
| 250 | HIM | 23 | 0.9 | 4% | 1.9 | 8% |
| 255 | HTH | 52 | 3.1 | 6% | 5.2 | 10% |
| 260 | HIM | 65 | 2.6 | 4% | 5.2 | 8% |
| 265 | HIM | 49 | 2.0 | 4% | 3.9 | 8% |
| 270 | HIM | 55 | 5.5 | 10% | 7.8 | 14% |
| 275 | HTH | 98 | 9.8 | 10% | 13.8 | 14% |
| 285 | HIM | 29 | 1.2 | 4% | 2.3 | 8% |
| 286 | HIM | 12 | 0.5 | 4% | 1.0 | 8% |
| 290 | HTH | 57 | 2.3 | 4% | 4.6 | 8% |
| 295 | HIM | 80 | 3.2 | 4% | 6.4 | 8% |
| 300 | HTH | 72 | 2.9 | 4% | 5.7 | 8% |
| 305 | HIM | 31 | 2.5 | 8% | 3.7 | 12% |
| 310 | HIM | 113 | 9.1 | 8% | 13.6 | 12% |
| 330 | HIM | 70 | 5.6 | 8% | 8.4 | 12% |
| 335 | HTH | 62 | 2.5 | 4% | 5.0 | 8% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[50] |
|---|---|---|---|---|---|---|
| 345 | HTH | 68 | 2.7 | 4% | 5.4 | 8% |
| 350 | HTH | 79 | 4.8 | 6% | 7.9 | 10% |
| 355 | HIM | 123 | 4.9 | 4% | 9.8 | 8% |
| 370 | HTH | 51 | 2.0 | 4% | 4.0 | 8% |
| 385 | HTH | 68 | 2.7 | 4% | 5.4 | 8% |
| 390 | HTH | 300 | 24.0 | 8% | 36.1 | 12% |
| 395 | HIM | 36 | 2.9 | 8% | 4.3 | 12% |
| 400 | HTH | 26 | 1.0 | 4% | 2.1 | 8% |
| 405 | HTH | 43 | 1.7 | 4% | 3.4 | 8% |
| 410 | HTH | 143 | 5.7 | 4% | 11.4 | 8% |
| 415 | HIM | 64 | 6.4 | 10% | 9.0 | 14% |
| 425 | HTH | 33 | 3.3 | 10% | 4.7 | 14% |
| 430 | HTH | 101 | 4.0 | 4% | 8.1 | 8% |
| 435 | HIM | 32 | 1.3 | 4% | 2.6 | 8% |
| 445 | HTH | 190 | 15.2 | 8% | 22.8 | 12% |
| 460 | HIM | 13 | 1.0 | 8% | 1.6 | 12% |
| 465 | HTH | 9 | 0.5 | 6% | 0.9 | 10% |
| 470 | HIM | 29 | 1.2 | 4% | 2.3 | 8% |
| 475 | HIM | 167 | 6.7 | 4% | 13.3 | 8% |
| 480 | HIM | 85 | 8.5 | 10% | 11.9 | 14% |
| 490 | HIM | 266 | 26.6 | 10% | 37.2 | 14% |
| 495 | HIM | 47 | 1.9 | 4% | 3.7 | 8% |
| 510 | HIM | 66 | 2.7 | 4% | 5.3 | 8% |
| 605 | HTH | 26 | 2.1 | 8% | 3.2 | 12% |
| 610 | HIM | 48 | 3.8 | 8% | 5.8 | 12% |
| 620 | HTH | 65 | 2.6 | 4% | 5.2 | 8% |
| 621 | Aspen | 43 | 1.7 | 4% | 3.5 | 8% |
| 630 | HTH | 68 | 5.5 | 8% | 8.2 | 12% |
| 640 | HIM | 166 | 6.6 | 4% | 13.3 | 8% |
| 645 | HIM | 296 | 11.8 | 4% | 23.7 | 8% |
| 650 | HTH | 54 | 2.2 | 4% | 4.3 | 8% |
| 655 | HTH | 185 | 14.8 | 8% | 22.2 | 12% |
| 660 | HIM | 14 | 0.6 | 4% | 1.1 | 8% |
| 665 | HTH | 214 | 21.4 | 10% | 30.0 | 14% |
| 670 | HIM | 38 | 1.5 | 4% | 3.0 | 8% |
| 675 | HIM | 52 | 4.2 | 8% | 6.3 | 12% |
| 680 | HTH | 58 | 5.8 | 10% | 8.2 | 14% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[50] |
|---|---|---|---|---|---|---|
| 685 | HTH | 121 | 7.2 | 6% | 12.1 | 10% |
| 690 | HTH | 120 | 4.8 | 4% | 9.6 | 8% |
| 700 | HIM | 67 | 2.7 | 4% | 5.3 | 8% |
| 710 | HIM | 105 | 4.2 | 4% | 8.4 | 8% |
| 720 | HTH | 17 | 1.0 | 6% | 1.7 | 10% |
| 725 | HTH | 32 | 1.3 | 4% | 2.6 | 8% |
| 730 | HIM | 73 | 7.3 | 10% | 10.2 | 14% |
| 735 | HTH | 67 | 2.7 | 4% | 5.4 | 8% |
| 740 | HIM | 339 | 27.1 | 8% | 40.6 | 12% |
| 745 | HIM | 168 | 13.5 | 8% | 20.2 | 12% |
| 750 | HTH | 95 | 3.8 | 4% | 7.6 | 8% |
| 755 | HTH | 106 | 4.3 | 4% | 8.5 | 8% |
| 765 | HIM | 370 | 14.8 | 4% | 29.6 | 8% |
| 770 | HIM | 165 | 6.6 | 4% | 13.2 | 8% |
| 775 | HIM | 235 | 23.5 | 10% | 32.9 | 14% |
| 780 | HIM | 100 | 4.0 | 4% | 8.0 | 8% |
| 785 | HTH | 199 | 8.0 | 4% | 15.9 | 8% |
| 795 | HTH | 22 | 0.9 | 4% | 1.8 | 8% |
| 796 | HTH | 40 | 1.6 | 4% | 3.2 | 8% |
| 800 | HTH | 69 | 4.2 | 6% | 6.9 | 10% |
| 805 | HTH | 57 | 2.3 | 4% | 4.6 | 8% |
| 810 | HTH | 149 | 6.0 | 4% | 11.9 | 8% |
| 815 | HTH | 92 | 3.7 | 4% | 7.4 | 8% |
| 820 | HIM | 164 | 6.5 | 4% | 13.1 | 8% |
| 825 | HTH | 68 | 2.7 | 4% | 5.4 | 8% |
| 830 | HTH | 60 | 2.4 | 4% | 4.8 | 8% |
| 835 | HTH | 18 | 0.7 | 4% | 1.4 | 8% |
| 850 | HTH | 27 | 2.2 | 8% | 3.3 | 12% |
| 855 | HTH | 33 | 2.7 | 8% | 4.0 | 12% |
| 860 | HIM | 9 | 0.4 | 4% | 0.7 | 8% |
| 865 | HTH | 51 | 2.0 | 4% | 4.1 | 8% |
| 870 | HTH | 145 | 14.5 | 10% | 20.4 | 14% |
| 875 | HTH | 57 | 2.3 | 4% | 4.6 | 8% |
| 876 | HTH | 40 | 1.6 | 4% | 3.2 | 8% |
| 880 | HTH | 84 | 3.4 | 4% | 6.7 | 8% |
| 885 | HTH | 30 | 1.2 | 4% | 2.4 | 8% |
| 890 | HTH | 21 | 1.2 | 6% | 2.1 | 10% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[50] |
|---|---|---|---|---|---|---|
| 895 | HTH | 92 | 9.2 | 10% | 12.9 | 14% |
| 940 | HIM | 150 | 15.0 | 10% | 21.0 | 14% |
| 945 | HIM | 106 | 4.2 | 4% | 8.5 | 8% |
| 965 | HTH | 33 | 1.3 | 4% | 2.6 | 8% |
| 975 | HTH | 41 | 1.6 | 4% | 3.3 | 8% |
| 980 | HTH | 37 | 1.5 | 4% | 3.0 | 8% |
| 1025 | HTH | 38 | 1.5 | 4% | 3.0 | 8% |
| 1030 | HTH | 97 | 3.9 | 4% | 7.8 | 8% |
| 1040 | HIM | 28 | 2.2 | 8% | 3.4 | 12% |
| 1045 | HTH | 105 | 4.2 | 4% | 8.4 | 8% |
| 1050 | HIM | 38 | 1.5 | 4% | 3.0 | 8% |
| 1051 | HIM | 7 | 0.7 | 10% | 1.0 | 14% |
| 1056 | HIM | 11 | 0.4 | 4% | 0.9 | 8% |
| 1060 | HTH | 66 | 2.6 | 4% | 5.3 | 8% |
| 1065 | HTH | 102 | 10.2 | 10% | 14.2 | 14% |
| 1070 | HTH | 43 | 1.7 | 4% | 3.4 | 8% |
| 1085 | HTH | 70 | 2.8 | 4% | 5.6 | 8% |
| 1090 | HIM | 20 | 0.8 | 4% | 1.6 | 8% |
| 1095 | HTH | 74 | 4.4 | 6% | 7.4 | 10% |
| 1096 | HTH | 24 | 1.0 | 4% | 1.9 | 8% |
| 2000 | HTH | 72 | 5.8 | 8% | 8.6 | 12% |
| 2005 | HTH | 83 | 3.3 | 4% | 6.6 | 8% |
| 2010 | HTH | 38 | 1.5 | 4% | 3.0 | 8% |

**Table 137. Alternative C: Estimates of Detrimental Soils Conditions following Mechanical Harvest by Activity Areas**

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[51] |
|---|---|---|---|---|---|---|
| 5 | HTH | 77 | 4.6 | 6% | 7.7 | 10% |
| 6 | HIM | 20 | 2.0 | 10% | 2.8 | 14% |
| 10 | HTH | 7 | 0.7 | 10% | 1.0 | 14% |
| 15 | HIM | 16 | 1.3 | 8% | 1.9 | 12% |
| 20 | HIM | 30 | 3.0 | 10% | 4.2 | 14% |
| 25 | HTH | 306 | 12.2 | 4% | 24.5 | 8% |
| 30 | HIM | 57 | 3.4 | 6% | 5.7 | 10% |
| 40 | HIM | 197 | 7.9 | 4% | 15.8 | 8% |
| 45 | HIM | 70 | 2.8 | 4% | 5.6 | 8% |
| 50 | HIM | 17 | 1.7 | 10% | 2.4 | 14% |
| 60 | HIM | 95 | 3.8 | 4% | 7.6 | 8% |
| 65 | HIM | 17 | 1.4 | 8% | 2.0 | 12% |
| 70 | HTH | 176 | 10.5 | 6% | 17.6 | 10% |
| 80 | HIM | 48 | 1.9 | 4% | 3.9 | 8% |
| 85 | HTH | 29 | 1.7 | 6% | 2.9 | 10% |
| 90 | HIM | 47 | 3.8 | 8% | 5.7 | 12% |
| 110 | HIM | 28 | 1.1 | 4% | 2.3 | 8% |
| 115 | HTH | 18 | 1.5 | 8% | 2.2 | 12% |
| 120 | HTH | 70 | 7.0 | 10% | 9.7 | 14% |
| 135 | HIM | 34 | 1.4 | 4% | 2.7 | 8% |
| 140 | HIM | 55 | 2.2 | 4% | 4.4 | 8% |
| 145 | HTH | 18 | 0.7 | 4% | 1.4 | 8% |
| 155 | HIM | 13 | 0.8 | 6% | 1.3 | 10% |
| 160 | HTH | 9 | 0.4 | 4% | 0.7 | 8% |
| 165 | HIM | 15 | 0.9 | 6% | 1.5 | 10% |
| 166 | HIM | 7 | 0.4 | 6% | 0.7 | 10% |
| 167 | HIM | 4 | 0.3 | 6% | 0.4 | 10% |
| 170 | HIM | 26 | 1.6 | 6% | 2.6 | 10% |
| 180 | HTH | 113 | 9.0 | 8% | 13.5 | 12% |
| 185 | HTH | 24 | 1.5 | 6% | 2.4 | 10% |
| 190 | HTH | 22 | 1.3 | 6% | 2.2 | 10% |

[51] All Activities includes: biomass removal (firewood, post and poles etc.), prescribed burning, post sale fuel reduction activities and pile disposal.

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[51] |
|---|---|---|---|---|---|---|
| 195 | HTH | 82 | 4.9 | 6% | 8.2 | 10% |
| 200 | HTH | 10 | 0.4 | 4% | 0.8 | 8% |
| 205 | HTH | 50 | 2.0 | 4% | 4.0 | 8% |
| 225 | HIM | 65 | 5.2 | 8% | 7.8 | 12% |
| 235 | HIM | 52 | 4.1 | 8% | 6.2 | 12% |
| 240 | HIM | 250 | 10.0 | 4% | 20.0 | 8% |
| 250 | HIM | 23 | 0.9 | 4% | 1.9 | 8% |
| 255 | HTH | 52 | 3.1 | 6% | 5.2 | 10% |
| 260 | HIM | 65 | 2.6 | 4% | 5.2 | 8% |
| 265 | HIM | 49 | 2.0 | 4% | 3.9 | 8% |
| 275 | HTH | 98 | 9.8 | 10% | 13.8 | 14% |
| 285 | HIM | 29 | 1.2 | 4% | 2.3 | 8% |
| 286 | HIM | 12 | 0.5 | 4% | 1.0 | 8% |
| 290 | HTH | 57 | 2.3 | 4% | 4.6 | 8% |
| 295 | HIM | 80 | 3.2 | 4% | 6.4 | 8% |
| 300 | HTH | 72 | 2.9 | 4% | 5.7 | 8% |
| 345 | HTH | 68 | 2.7 | 4% | 5.4 | 8% |
| 350 | HTH | 79 | 4.8 | 6% | 7.9 | 10% |
| 355 | HIM | 123 | 4.9 | 4% | 9.8 | 8% |
| 370 | HTH | 51 | 4.0 | 8% | 6.1 | 12% |
| 385 | HTH | 68 | 2.7 | 4% | 5.4 | 8% |
| 390 | HTH | 300 | 24.0 | 8% | 36.1 | 12% |
| 400 | HTH | 26 | 1.0 | 4% | 2.1 | 8% |
| 405 | HTH | 43 | 1.7 | 4% | 3.4 | 8% |
| 410 | HTH | 143 | 5.7 | 4% | 11.4 | 8% |
| 425 | HTH | 33 | 3.3 | 10% | 4.7 | 14% |
| 430 | HTH | 101 | 4.0 | 4% | 8.1 | 8% |
| 445 | HTH | 190 | 15.2 | 8% | 22.8 | 12% |
| 465 | HTH | 9 | 0.5 | 6% | 0.9 | 10% |
| 470 | HIM | 29 | 1.2 | 4% | 2.3 | 8% |
| 490 | HIM | 266 | 26.6 | 10% | 37.2 | 14% |
| 495 | HIM | 47 | 1.9 | 4% | 3.7 | 8% |
| 510 | HIM | 66 | 2.7 | 4% | 5.3 | 8% |
| 605 | HTH | 26 | 2.1 | 8% | 3.2 | 12% |
| 610 | HIM | 48 | 3.8 | 8% | 5.8 | 12% |
| 615 | Fuels Only | 182 | 7.3 | 4% | 14.5 | 8% |
| 620 | HTH | 65 | 2.6 | 4% | 5.2 | 8% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[51] |
|---|---|---|---|---|---|---|
| 621 | Aspen | 43 | 1.7 | 4% | 3.5 | 8% |
| 625 | Fuels Only | 76 | 3.0 | 4% | 6.0 | 8% |
| 630 | HTH | 68 | 5.5 | 8% | 8.2 | 12% |
| 640 | HIM | 166 | 6.6 | 4% | 13.3 | 8% |
| 645 | HIM | 296 | 11.8 | 4% | 23.7 | 8% |
| 650 | HTH | 54 | 2.2 | 4% | 4.3 | 8% |
| 655 | HTH | 185 | 14.8 | 8% | 22.2 | 12% |
| 660 | HIM | 14 | 0.6 | 4% | 1.1 | 8% |
| 665 | HTH | 214 | 21.4 | 10% | 30.0 | 14% |
| 670 | HIM | 38 | 1.5 | 4% | 3.0 | 8% |
| 680 | HTH | 58 | 5.8 | 10% | 8.2 | 14% |
| 685 | HTH | 121 | 7.2 | 6% | 12.1 | 10% |
| 690 | HTH | 120 | 4.8 | 4% | 9.6 | 8% |
| 700 | HIM | 67 | 2.7 | 4% | 5.3 | 8% |
| 710 | HIM | 105 | 4.2 | 4% | 8.4 | 8% |
| 720 | HTH | 17 | 1.0 | 6% | 1.7 | 10% |
| 725 | HTH | 32 | 1.3 | 4% | 2.6 | 8% |
| 730 | HIM | 73 | 5.8 | 8% | 8.7 | 12% |
| 735 | HTH | 67 | 2.7 | 4% | 5.4 | 8% |
| 750 | HTH | 95 | 3.8 | 4% | 7.6 | 8% |
| 755 | HTH | 106 | 4.3 | 4% | 8.5 | 8% |
| 765 | HIM | 370 | 14.8 | 4% | 29.6 | 8% |
| 770 | HIM | 164 | 6.6 | 4% | 13.2 | 8% |
| 775 | HIM | 235 | 23.5 | 10% | 32.9 | 14% |
| 785 | HTH | 199 | 8.0 | 4% | 15.9 | 8% |
| 795 | HTH | 22 | 0.9 | 4% | 1.8 | 8% |
| 796 | HTH | 40 | 1.6 | 4% | 3.2 | 8% |
| 800 | HTH | 69 | 4.2 | 6% | 6.9 | 10% |
| 805 | HTH | 57 | 2.3 | 4% | 4.6 | 8% |
| 815 | HTH | 92 | 3.7 | 4% | 7.4 | 8% |
| 820 | HIM | 164 | 6.5 | 4% | 13.1 | 8% |
| 825 | HTH | 68 | 2.7 | 4% | 5.4 | 8% |
| 830 | HTH | 60 | 2.4 | 4% | 4.8 | 8% |
| 835 | HTH | 18 | 0.7 | 4% | 1.4 | 8% |
| 850 | HTH | 27 | 2.2 | 8% | 3.3 | 12% |
| 855 | HTH | 33 | 2.7 | 8% | 4.0 | 12% |
| 860 | HIM | 9 | 0.4 | 4% | 0.7 | 8% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[51] |
|---|---|---|---|---|---|---|
| 865 | HTH | 51 | 2.0 | 4% | 4.1 | 8% |
| 870 | HTH | 145 | 14.5 | 10% | 20.3 | 14% |
| 875 | HTH | 57 | 2.3 | 4% | 4.6 | 8% |
| 876 | HTH | 40 | 1.6 | 4% | 3.2 | 8% |
| 880 | HTH | 84 | 3.4 | 4% | 6.7 | 8% |
| 885 | HTH | 30 | 1.2 | 4% | 2.4 | 8% |
| 890 | HTH | 21 | 1.2 | 6% | 2.1 | 10% |
| 895 | HTH | 92 | 9.2 | 10% | 12.9 | 14% |
| 905 | Fuels Only | 173 | 6.9 | 4% | 6.9 | 4% |
| 910 | Fuels Only | 47 | 1.9 | 4% | 1.9 | 4% |
| 925 | Fuels Only | 47 | 1.9 | 4% | 1.9 | 4% |
| 930 | Fuels Only | 199 | 7.9 | 4% | 7.9 | 4% |
| 935 | Fuels Only | 37 | 1.5 | 4% | 1.5 | 4% |
| 940 | HIM | 150 | 15.0 | 10% | 21.0 | 14% |
| 945 | HIM | 106 | 4.2 | 4% | 8.5 | 8% |
| 965 | HTH | 33 | 1.3 | 4% | 2.6 | 8% |
| 970 | Fuels Only | 49 | 2.0 | 4% | 2.0 | 4% |
| 980 | HTH | 37 | 1.5 | 4% | 3.0 | 8% |
| 1020 | Fuels Only | 86 | 3.4 | 4% | 3.4 | 4% |
| 1025 | HTH | 38 | 1.5 | 4% | 3.0 | 8% |
| 1030 | HTH | 97 | 3.9 | 4% | 7.8 | 8% |
| 1040 | HIM | 28 | 2.2 | 8% | 3.4 | 12% |
| 1045 | HTH | 105 | 4.2 | 4% | 8.4 | 8% |
| 1050 | HIM | 38 | 1.5 | 4% | 3.0 | 8% |
| 1051 | HIM | 7 | 0.7 | 10% | 1.0 | 14% |
| 1060 | HTH | 66 | 2.6 | 4% | 5.3 | 8% |
| 1065 | HTH | 102 | 10.2 | 10% | 14.2 | 14% |
| 1070 | HTH | 43 | 1.7 | 4% | 3.4 | 8% |
| 1080 | Fuels Only | 92 | 3.7 | 4% | 3.7 | 4% |
| 1085 | HTH | 70 | 2.8 | 4% | 5.6 | 8% |
| 1095 | HTH | 74 | 4.4 | 6% | 7.4 | 10% |
| 1096 | HTH | 24 | 1.0 | 4% | 1.9 | 8% |
| 2000 | HTH | 72 | 5.8 | 8% | 8.6 | 12% |
| 2005 | HTH | 83 | 3.3 | 4% | 6.6 | 8% |
| 2010 | HTH | 38 | 1.5 | 4% | 3.0 | 8% |
| 3000 | Fuels Only | 219 | 8.7 | 4% | 8.7 | 4% |
| 3005 | Fuels Only | 138 | 5.5 | 4% | 5.5 | 4% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[51] |
|---|---|---|---|---|---|---|
| 3010 | Fuels Only | 128 | 5.1 | 4% | 5.1 | 4% |
| 3015 | Fuels Only | 127 | 5.1 | 4% | 5.1 | 4% |
| 3020 | Fuels Only | 206 | 8.3 | 4% | 8.3 | 4% |
| 3025 | Fuels Only | 142 | 5.7 | 4% | 5.7 | 4% |
| 3030 | Fuels Only | 37 | 1.5 | 4% | 1.5 | 4% |
| 3035 | Fuels Only | 20 | 0.8 | 4% | 0.8 | 4% |
| 3040 | Fuels Only | 55 | 2.2 | 4% | 2.2 | 4% |
| 3045 | Fuels Only | 18 | 0.7 | 4% | 0.7 | 4% |
| 3050 | Fuels Only | 107 | 4.3 | 4% | 4.3 | 4% |
| 3055 | Fuels Only | 5 | 0.2 | 4% | 0.2 | 4% |
| 3060 | Fuels Only | 91 | 3.7 | 4% | 3.7 | 4% |
| 3065 | Fuels Only | 144 | 5.8 | 4% | 5.8 | 4% |
| 3070 | Fuels Only | 68 | 2.7 | 4% | 2.7 | 4% |
| 3075 | Fuels Only | 15 | 0.9 | 6% | 0.9 | 6% |
| 3080 | Fuels Only | 43 | 1.7 | 4% | 1.7 | 4% |
| 3085 | Fuels Only | 14 | 0.6 | 4% | 0.6 | 4% |
| 3090 | Fuels Only | 14 | 0.6 | 4% | 0.6 | 4% |
| 3095 | Fuels Only | 41 | 1.6 | 4% | 1.6 | 4% |
| 4000 | Fuels Only | 16 | 0.6 | 4% | 0.6 | 4% |
| 4005 | Fuels Only | 7 | 0.3 | 4% | 0.3 | 4% |
| 4010 | Fuels Only | 27 | 1.1 | 4% | 1.1 | 4% |
| 4015 | Fuels Only | 13 | 0.5 | 4% | 0.5 | 4% |
| 4020 | Fuels Only | 60 | 2.4 | 4% | 2.4 | 4% |
| 4025 | Fuels Only | 8 | 0.3 | 4% | 0.3 | 4% |
| 4030 | Fuels Only | 78 | 3.1 | 4% | 3.1 | 4% |
| 4035 | Fuels Only | 153 | 6.1 | 4% | 6.1 | 4% |
| 4040 | Fuels Only | 146 | 5.8 | 4% | 5.8 | 4% |
| 4045 | Fuels Only | 80 | 3.2 | 4% | 3.2 | 4% |
| 4050 | Fuels Only | 292 | 11.7 | 4% | 11.7 | 4% |
| 4055 | Fuels Only | 108 | 4.3 | 4% | 4.3 | 4% |
| 4060 | Fuels Only | 63 | 2.5 | 4% | 2.5 | 4% |
| 4065 | Fuels Only | 14 | 0.5 | 4% | 0.5 | 4% |
| 4070 | Fuels Only | 62 | 2.5 | 4% | 2.5 | 4% |
| 4075 | Fuels Only | 42 | 1.7 | 4% | 1.7 | 4% |
| 4080 | Fuels Only | 11 | 0.4 | 4% | 0.4 | 4% |
| 4085 | Fuels Only | 79 | 3.2 | 4% | 3.2 | 4% |
| 4090 | Fuels Only | 7 | 0.3 | 4% | 0.3 | 4% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[51] |
|---|---|---|---|---|---|---|
| 4095 | Fuels Only | 393 | 15.7 | 4% | 15.7 | 4% |
| 5000 | Fuels Only | 58 | 2.3 | 4% | 2.3 | 4% |
| 5005 | Fuels Only | 56 | 2.2 | 4% | 2.2 | 4% |
| 5010 | Fuels Only | 9 | 0.4 | 4% | 0.4 | 4% |
| 5015 | Fuels Only | 39 | 1.6 | 4% | 1.6 | 4% |
| 5020 | Fuels Only | 18 | 0.7 | 4% | 0.7 | 4% |
| 5025 | Fuels Only | 19 | 0.8 | 4% | 0.8 | 4% |
| 5030 | Fuels Only | 22 | 0.9 | 4% | 0.9 | 4% |
| 5035 | Fuels Only | 408 | 16.3 | 4% | 16.3 | 4% |
| 5040 | Fuels Only | 46 | 1.8 | 4% | 1.8 | 4% |
| 5045 | Fuels Only | 35 | 1.4 | 4% | 1.4 | 4% |

**Table 138. Alternative D: Estimates of Detrimental Soil Conditions following Mechanical Harvest by Activity Areas**

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[52] |
|---|---|---|---|---|---|---|
| 5 | HTH | 77 | 4.6 | 6% | 7.7 | 10.0% |
| 6 | HIM | 20 | 2.0 | 10% | 2.8 | 14.0% |
| 10 | HTH | 7 | 0.7 | 10% | 1.0 | 14.0% |
| 15 | HIM | 16 | 1.3 | 8% | 1.9 | 12.0% |
| 20 | HIM | 30 | 3.0 | 10% | 4.2 | 14.0% |
| 25 | HTH | 306 | 12.2 | 4% | 24.5 | 8.0% |
| 30 | HIM | 57 | 3.4 | 6% | 5.7 | 10.0% |
| 40 | HIM | 197 | 7.9 | 4% | 15.8 | 8.0% |
| 45 | HIM | 70 | 2.8 | 4% | 5.6 | 8.0% |
| 50 | HIM | 17 | 1.7 | 10% | 2.4 | 14.0% |
| 60 | HIM | 95 | 3.8 | 4% | 7.6 | 8.0% |
| 65 | HIM | 17 | 1.4 | 8% | 2.0 | 12.0% |
| 70 | HTH | 176 | 10.5 | 6% | 17.6 | 10.0% |
| 80 | HIM | 48 | 1.9 | 4% | 3.9 | 8.0% |
| 85 | HTH | 29 | 1.7 | 6% | 2.9 | 10.0% |
| 90 | HIM | 47 | 3.8 | 8% | 5.7 | 12.0% |
| 110 | HIM | 28 | 1.1 | 4% | 2.3 | 8.0% |
| 115 | HTH | 18 | 1.5 | 8% | 2.2 | 12.0% |
| 120 | HTH | 70 | 7.0 | 10% | 9.7 | 14.0% |
| 135 | HIM | 34 | 1.4 | 4% | 2.7 | 8.0% |
| 140 | HIM | 55 | 2.2 | 4% | 4.4 | 8.0% |
| 145 | HTH | 18 | 0.7 | 4% | 1.4 | 8.0% |
| 155 | HIM | 13 | 0.8 | 6% | 1.3 | 10.0% |
| 160 | HTH | 9 | 0.4 | 4% | 0.7 | 8.0% |
| 165 | HIM | 15 | 0.9 | 6% | 1.5 | 10.0% |
| 166 | HIM | 7 | 0.4 | 6% | 0.7 | 10.0% |
| 167 | HIM | 4 | 0.3 | 6% | 0.4 | 10.0% |
| 170 | HIM | 26 | 1.6 | 6% | 2.6 | 10.0% |
| 180 | HTH | 113 | 9.0 | 8% | 13.5 | 12.0% |
| 185 | HTH | 24 | 1.5 | 6% | 2.4 | 10.0% |
| 190 | HTH | 22 | 1.3 | 6% | 2.2 | 10.0% |

[52] All Activities includes: biomass removal (firewood, post and poles etc.), prescribed burning, post sale fuel reduction activities, and pile disposal.

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[52] |
|---|---|---|---|---|---|---|
| 195 | HTH | 82 | 4.9 | 6% | 8.2 | 10.0% |
| 200 | HTH | 10 | 0.4 | 4% | 0.8 | 8.0% |
| 205 | HTH | 50 | 2.0 | 4% | 4.0 | 8.0% |
| 225 | HIM | 65 | 5.2 | 8% | 7.8 | 12.0% |
| 235 | HIM | 52 | 4.1 | 8% | 6.2 | 12.0% |
| 240 | HSG | 250 | 10.0 | 4% | 20.0 | 8.0% |
| 250 | HIM | 23 | 0.9 | 4% | 1.9 | 8.0% |
| 255 | HTH | 52 | 3.1 | 6% | 5.2 | 10.0% |
| 260 | HIM | 65 | 2.6 | 4% | 5.2 | 8.0% |
| 265 | HIM | 49 | 2.0 | 4% | 3.9 | 8.0% |
| 275 | HTH | 98 | 9.8 | 10% | 13.8 | 14.0% |
| 285 | HIM | 29 | 1.2 | 4% | 2.3 | 8.0% |
| 286 | HIM | 12 | 0.5 | 4% | 1.0 | 8.0% |
| 290 | HTH | 57 | 2.3 | 4% | 4.6 | 8.0% |
| 295 | HIM | 80 | 3.2 | 4% | 6.4 | 8.0% |
| 300 | HTH | 72 | 2.9 | 4% | 5.7 | 8.0% |
| 345 | HTH | 68 | 2.7 | 4% | 5.4 | 8.0% |
| 350 | HTH | 79 | 4.8 | 6% | 7.9 | 10.0% |
| 355 | HIM | 123 | 4.9 | 4% | 9.8 | 8.0% |
| 370 | HTH | 51 | 4.0 | 8% | 6.1 | 12.0% |
| 385 | HTH | 68 | 2.7 | 4% | 5.4 | 8.0% |
| 390 | HTH | 300 | 24.0 | 8% | 36.1 | 12.0% |
| 400 | HTH | 26 | 1.0 | 4% | 2.1 | 8.0% |
| 405 | HTH | 43 | 1.7 | 4% | 3.4 | 8.0% |
| 410 | HTH | 143 | 5.7 | 4% | 11.4 | 8.0% |
| 425 | HTH | 33 | 3.3 | 10% | 4.7 | 14.0% |
| 430 | HTH | 101 | 4.0 | 4% | 8.1 | 8.0% |
| 445 | HTH | 190 | 15.2 | 8% | 22.8 | 12.0% |
| 465 | HTH | 9 | 0.5 | 6% | 0.9 | 10.0% |
| 470 | HIM | 29 | 1.2 | 4% | 2.3 | 8.0% |
| 490 | HIM | 266 | 26.6 | 10% | 37.2 | 14.0% |
| 495 | HIM | 47 | 1.9 | 4% | 3.7 | 8.0% |
| 510 | HIM | 66 | 2.7 | 4% | 5.3 | 8.0% |
| 605 | HTH | 26 | 2.1 | 8% | 3.2 | 12.0% |
| 610 | HIM | 48 | 3.8 | 8% | 5.8 | 12.0% |
| 615 | Fuels Only | 182 | 7.3 | 4% | 14.5 | 8.0% |
| 620 | HSG | 65 | 2.6 | 4% | 5.2 | 8.0% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[52] |
|---|---|---|---|---|---|---|
| 621 | Aspen | 43 | 1.7 | 4% | 3.5 | 8.0% |
| 625 | Fuels Only | 76 | 3.0 | 4% | 3.0 | 4.0% |
| 630 | HTH | 68 | 5.5 | 8% | 8.2 | 12.0% |
| 640 | HIM | 166 | 6.6 | 4% | 13.3 | 8.0% |
| 645 | HIM | 296 | 11.8 | 4% | 23.7 | 8.0% |
| 650 | HSG | 54 | 2.2 | 4% | 4.3 | 8.0% |
| 655 | HSG | 185 | 14.8 | 8% | 22.2 | 12.0% |
| 660 | HIM | 14 | 0.6 | 4% | 1.1 | 8.0% |
| 665 | HTH | 214 | 21.4 | 10% | 30.0 | 14.0% |
| 670 | HIM | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 680 | HTH | 58 | 5.8 | 10% | 8.2 | 14.0% |
| 685 | HSG | 121 | 7.2 | 6% | 12.1 | 10.0% |
| 690 | HSG | 120 | 4.8 | 4% | 9.6 | 8.0% |
| 700 | HIM | 67 | 2.7 | 4% | 5.3 | 8.0% |
| 710 | HIM | 105 | 4.2 | 4% | 8.4 | 8.0% |
| 720 | HTH | 17 | 1.0 | 6% | 1.7 | 10.0% |
| 725 | HTH | 32 | 1.3 | 4% | 2.6 | 8.0% |
| 730 | HIM | 73 | 5.8 | 8% | 8.7 | 12.0% |
| 735 | HSG | 67 | 2.7 | 4% | 5.4 | 8.0% |
| 750 | HSG | 95 | 3.8 | 4% | 7.6 | 8.0% |
| 755 | HSG | 106 | 4.3 | 4% | 8.5 | 8.0% |
| 765 | HSG | 370 | 14.8 | 4% | 29.6 | 8.0% |
| 770 | HSG | 164 | 6.6 | 4% | 13.2 | 8.0% |
| 775 | HSG | 235 | 23.5 | 10% | 32.9 | 14.0% |
| 785 | HSG | 199 | 8.0 | 4% | 15.9 | 8.0% |
| 795 | HTH | 22 | 0.9 | 4% | 1.8 | 8.0% |
| 796 | HTH | 40 | 1.6 | 4% | 3.2 | 8.0% |
| 800 | HSG | 69 | 4.2 | 6% | 6.9 | 10.0% |
| 805 | HSG | 57 | 2.3 | 4% | 4.6 | 8.0% |
| 815 | HTH | 92 | 3.7 | 4% | 7.4 | 8.0% |
| 820 | HSG | 164 | 6.5 | 4% | 13.1 | 8.0% |
| 825 | HSG | 68 | 2.7 | 4% | 5.4 | 8.0% |
| 830 | HTH | 60 | 2.4 | 4% | 4.8 | 8.0% |
| 835 | HTH | 18 | 0.7 | 4% | 1.4 | 8.0% |
| 850 | HSG | 27 | 2.2 | 8% | 3.3 | 12.0% |
| 855 | HSG | 33 | 2.7 | 8% | 4.0 | 12.0% |
| 860 | HIM | 9 | 0.4 | 4% | 0.7 | 8.0% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[52] |
|---|---|---|---|---|---|---|
| 865 | HTH | 51 | 2.0 | 4% | 4.1 | 8.0% |
| 870 | HTH | 145 | 14.5 | 10% | 20.3 | 14.0% |
| 875 | HTH | 57 | 2.3 | 4% | 4.6 | 8.0% |
| 876 | HTH | 40 | 1.6 | 4% | 3.2 | 8.0% |
| 880 | HTH | 84 | 3.4 | 4% | 6.7 | 8.0% |
| 885 | HSG | 30 | 1.2 | 4% | 2.4 | 8.0% |
| 890 | HSG | 21 | 1.2 | 6% | 2.1 | 10.0% |
| 895 | HSG | 92 | 9.2 | 10% | 12.9 | 14.0% |
| 905 | Fuels Only | 173 | 6.9 | 4% | 6.9 | 4% |
| 910 | Fuels Only | 47 | 1.9 | 4% | 1.9 | 4% |
| 925 | Fuels Only | 47 | 1.9 | 4% | 1.9 | 4% |
| 930 | Fuels Only | 199 | 7.9 | 4% | 7.9 | 4% |
| 935 | Fuels Only | 37 | 1.5 | 4% | 1.5 | 4% |
| 940 | HIM | 150 | 15.0 | 10% | 21.0 | 14.0% |
| 945 | HIM | 106 | 4.2 | 4% | 8.5 | 8.0% |
| 965 | HTH | 33 | 1.3 | 4% | 2.6 | 8.0% |
| 970 | Fuels Only | 49 | 2.0 | 4% | 2.0 | 4.0% |
| 980 | HTH | 37 | 1.5 | 4% | 3.0 | 8.0% |
| 1020 | Fuels Only | 86 | 3.4 | 4% | 3.4 | 4.0% |
| 1025 | HTH | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 1030 | HTH | 97 | 3.9 | 4% | 7.8 | 8.0% |
| 1040 | HIM | 28 | 2.2 | 8% | 3.4 | 12.0% |
| 1045 | HTH | 105 | 4.2 | 4% | 8.4 | 8.0% |
| 1050 | HIM | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 1051 | HIM | 7 | 0.7 | 10% | 1.0 | 14.0% |
| 1060 | HTH | 66 | 2.6 | 4% | 5.3 | 8.0% |
| 1065 | HTH | 102 | 10.2 | 10% | 14.2 | 14.0% |
| 1070 | HTH | 43 | 1.7 | 4% | 3.4 | 8.0% |
| 1080 | Fuels Only | 92 | 3.7 | 4% | 3.7 | 4.0% |
| 1085 | HTH | 70 | 2.8 | 4% | 5.6 | 8.0% |
| 1095 | HTH | 74 | 4.4 | 6% | 7.4 | 10.0% |
| 1096 | HTH | 24 | 1.0 | 4% | 1.9 | 8.0% |
| 2000 | HTH | 72 | 5.8 | 8% | 8.6 | 12.0% |
| 2005 | HTH | 83 | 3.3 | 4% | 6.6 | 8.0% |
| 2010 | HTH | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 3000 | Fuels Only | 219 | 8.7 | 4% | 8.7 | 4% |
| 3005 | Fuels Only | 138 | 5.5 | 4% | 5.5 | 4% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[52] |
|---|---|---|---|---|---|---|
| 3010 | Fuels Only | 128 | 5.1 | 4% | 5.1 | 4% |
| 3015 | Fuels Only | 127 | 5.1 | 4% | 5.1 | 4% |
| 3020 | Fuels Only | 206 | 8.3 | 4% | 8.3 | 4% |
| 3025 | Fuels Only | 142 | 5.7 | 4% | 5.7 | 4% |
| 3030 | Fuels Only | 37 | 1.5 | 4% | 1.5 | 4% |
| 3035 | Fuels Only | 20 | 0.8 | 4% | 0.8 | 4% |
| 3040 | Fuels Only | 55 | 2.2 | 4% | 2.2 | 4% |
| 3045 | Fuels Only | 18 | 0.7 | 4% | 0.7 | 4% |
| 3050 | Fuels Only | 107 | 4.3 | 4% | 4.3 | 4% |
| 3055 | Fuels Only | 5 | 0.2 | 4% | 0.2 | 4% |
| 3060 | Fuels Only | 91 | 3.7 | 4% | 3.7 | 4% |
| 3065 | Fuels Only | 144 | 5.8 | 4% | 5.8 | 4% |
| 3070 | Fuels Only | 68 | 2.7 | 4% | 2.7 | 4% |
| 3075 | Fuels Only | 15 | 0.6 | 4% | 0.6 | 4% |
| 3080 | Fuels Only | 43 | 1.7 | 4% | 1.7 | 4% |
| 3085 | Fuels Only | 14 | 0.6 | 4% | 0.6 | 4% |
| 3090 | Fuels Only | 14 | 0.6 | 4% | 0.6 | 4% |
| 3095 | Fuels Only | 41 | 1.6 | 4% | 1.6 | 4% |
| 4000 | Fuels Only | 16 | 0.6 | 4% | 0.6 | 4% |
| 4005 | Fuels Only | 7 | 0.3 | 4% | 0.3 | 4% |
| 4010 | Fuels Only | 27 | 1.1 | 4% | 1.1 | 4% |
| 4015 | Fuels Only | 13 | 0.5 | 4% | 0.5 | 4% |
| 4020 | Fuels Only | 60 | 2.4 | 4% | 2.4 | 4% |
| 4025 | Fuels Only | 8 | 0.3 | 4% | 0.3 | 4% |
| 4030 | Fuels Only | 78 | 3.1 | 4% | 3.1 | 4% |
| 4035 | Fuels Only | 153 | 6.1 | 4% | 6.1 | 4% |
| 4040 | Fuels Only | 146 | 5.8 | 4% | 5.8 | 4% |
| 4045 | Fuels Only | 80 | 3.2 | 4% | 3.2 | 4% |
| 4050 | Fuels Only | 292 | 11.7 | 4% | 11.7 | 4% |
| 4055 | Fuels Only | 108 | 4.3 | 4% | 4.3 | 4% |
| 4060 | Fuels Only | 63 | 2.5 | 4% | 2.5 | 4% |
| 4065 | Fuels Only | 14 | 0.5 | 4% | 0.5 | 4% |
| 4070 | Fuels Only | 62 | 2.5 | 4% | 2.5 | 4% |
| 4075 | Fuels Only | 42 | 1.7 | 4% | 1.7 | 4% |
| 4080 | Fuels Only | 11 | 0.4 | 4% | 0.4 | 4% |
| 4085 | Fuels Only | 79 | 3.2 | 4% | 3.2 | 4% |
| 4090 | Fuels Only | 7 | 0.3 | 4% | 0.3 | 4% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[52] |
|---|---|---|---|---|---|---|
| 4095 | Fuels Only | 393 | 15.7 | 4% | 15.7 | 4% |
| 5000 | Fuels Only | 58 | 2.3 | 4% | 2.3 | 4% |
| 5005 | Fuels Only | 56 | 2.2 | 4% | 2.2 | 4% |
| 5010 | Fuels Only | 9 | 0.4 | 4% | 0.4 | 4% |
| 5015 | Fuels Only | 39 | 1.6 | 4% | 1.6 | 4% |
| 5020 | Fuels Only | 18 | 0.7 | 4% | 0.7 | 4% |
| 5025 | Fuels Only | 19 | 0.8 | 4% | 0.8 | 4% |
| 5030 | Fuels Only | 22 | 0.9 | 4% | 0.9 | 4% |
| 5035 | Fuels Only | 408 | 16.3 | 4% | 16.3 | 4% |
| 5040 | Fuels Only | 46 | 1.8 | 4% | 1.8 | 4% |
| 5045 | Fuels Only | 35 | 1.4 | 4% | 1.4 | 4% |

**Table 139. Alternative E: Estimates of Detrimental Soil Conditions following Mechanical Harvest by Activity Areas**

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[53] |
|---|---|---|---|---|---|---|
| 5 | HTH | 77 | 4.6 | 6% | 7.7 | 10.0% |
| 6 | HIM | 20 | 2.0 | 10% | 2.7 | 14.0% |
| 10 | HTH | 7 | 0.7 | 10% | 1.0 | 14.0% |
| 15 | HIM | 16 | 1.3 | 8% | 1.9 | 12.0% |
| 20 | HIM | 30 | 3.0 | 10% | 4.2 | 14.0% |
| 25 | HTH | 306 | 12.2 | 4% | 24.5 | 8.0% |
| 30 | HIM | 57 | 3.4 | 6% | 5.7 | 10.0% |
| 40 | HIM | 197 | 7.9 | 4% | 15.8 | 8.0% |
| 45 | HIM | 70 | 7.0 | 10% | 9.9 | 14.0% |
| 50 | HIM | 17 | 1.7 | 10% | 2.4 | 14.0% |
| 55 | HIM | 31 | 1.8 | 6% | 3.1 | 10.0% |
| 60 | HIM | 95 | 3.8 | 4% | 7.6 | 8.0% |
| 65 | HIM | 17 | 1.4 | 8% | 2.0 | 12.0% |
| 70 | HTH | 176 | 10.5 | 6% | 17.6 | 10.0% |
| 80 | HIM | 48 | 3.9 | 8% | 5.8 | 12.0% |
| 85 | HTH | 29 | 2.3 | 8% | 3.5 | 12.0% |
| 90 | HIM | 47 | 4.7 | 10% | 6.6 | 14.0% |
| 95 | HTH | 74 | 3.0 | 4% | 6.0 | 8.0% |
| 110 | HIM | 28 | 1.1 | 4% | 2.3 | 8.0% |
| 115 | HTH | 18 | 1.5 | 8% | 2.2 | 12.0% |
| 120 | HTH | 70 | 7.0 | 10% | 9.7 | 14.0% |
| 125 | HIM | 31 | 1.2 | 4% | 2.4 | 8.0% |
| 135 | HIM | 34 | 1.4 | 4% | 2.7 | 8.0% |
| 140 | HIM | 55 | 2.2 | 4% | 4.4 | 8.0% |
| 145 | HTH | 18 | 0.7 | 4% | 1.4 | 8.0% |
| 150 | HIM | 53 | 5.3 | 10% | 7.5 | 14.0% |
| 155 | HIM | 13 | 0.8 | 6% | 1.3 | 10.0% |
| 160 | HTH | 9 | 0.4 | 4% | 0.7 | 8.0% |
| 165 | HIM | 15 | 0.9 | 6% | 1.5 | 10.0% |
| 166 | HIM | 7 | 0.4 | 6% | 0.7 | 10.0% |
| 167 | HIM | 4 | 0.3 | 6% | 0.4 | 10.0% |

[53] All Activities includes: biomass removal (firewood, post and poles etc.), prescribed burning, post sale fuel reduction activities, and pile disposal.

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[53] |
|---|---|---|---|---|---|---|
| 170 | HIM | 26 | 1.6 | 6% | 2.6 | 10.0% |
| 171 | HIM | 22 | 0.9 | 4% | 1.8 | 8.0% |
| 180 | HTH | 113 | 9.0 | 8% | 13.5 | 12.0% |
| 185 | HTH | 24 | 1.5 | 6% | 2.4 | 10.0% |
| 190 | HTH | 22 | 1.3 | 6% | 2.2 | 10.0% |
| 195 | HTH | 82 | 6.5 | 8% | 9.8 | 12.0% |
| 200 | HTH | 10 | 0.4 | 4% | 0.8 | 8.0% |
| 205 | HTH | 50 | 2.0 | 4% | 4.0 | 8.0% |
| 215 | HIM | 15 | 0.6 | 4% | 1.2 | 8.0% |
| 220 | HIM | 23 | 0.9 | 4% | 1.9 | 8.0% |
| 225 | HIM | 65 | 5.2 | 8% | 7.8 | 12.0% |
| 235 | HIM | 52 | 4.1 | 8% | 6.2 | 12.0% |
| 240 | AltMist | 250 | 10.0 | 4% | 20.0 | 8.0% |
| 245 | HIM | 24 | 2.4 | 10% | 3.4 | 14.0% |
| 250 | HIM | 23 | 0.9 | 4% | 1.9 | 8.0% |
| 255 | HTH | 52 | 3.1 | 6% | 5.2 | 10.0% |
| 260 | HIM | 65 | 2.6 | 4% | 5.2 | 8.0% |
| 265 | HIM | 49 | 2.0 | 4% | 3.9 | 8.0% |
| 270 | HIM | 55 | 5.5 | 10% | 7.8 | 14.0% |
| 275 | HTH | 98 | 9.8 | 10% | 13.8 | 14.0% |
| 285 | HIM | 29 | 1.2 | 4% | 2.3 | 8.0% |
| 286 | HIM | 12 | 0.5 | 4% | 1.0 | 8.0% |
| 290 | HTH | 57 | 2.3 | 4% | 4.6 | 8.0% |
| 295 | HIM | 80 | 3.2 | 4% | 6.4 | 8.0% |
| 300 | HTH | 72 | 2.9 | 4% | 5.7 | 8.0% |
| 310 | HIM | 113 | 9.1 | 8% | 13.6 | 12.0% |
| 330 | HIM | 70 | 5.6 | 8% | 8.4 | 12.0% |
| 345 | HTH | 68 | 2.7 | 4% | 5.4 | 8.0% |
| 350 | HTH | 79 | 4.8 | 6% | 7.9 | 10.0% |
| 355 | HIM | 123 | 4.9 | 4% | 9.8 | 8.0% |
| 370 | HTH | 51 | 2.0 | 4% | 4.0 | 8.0% |
| 385 | HTH | 68 | 2.7 | 4% | 5.4 | 8.0% |
| 390 | HTH | 300 | 24.0 | 8% | 36.1 | 12.0% |
| 400 | HTH | 26 | 1.0 | 4% | 2.1 | 8.0% |
| 405 | HTH | 43 | 1.7 | 4% | 3.4 | 8.0% |
| 410 | HTH | 143 | 5.7 | 4% | 11.4 | 8.0% |
| 415 | HIM | 64 | 6.4 | 10% | 9.0 | 14.0% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[53] |
|---|---|---|---|---|---|---|
| 425 | HTH | 33 | 3.3 | 10% | 4.7 | 14.0% |
| 430 | HTH | 101 | 4.0 | 4% | 8.1 | 8.0% |
| 445 | HTH | 190 | 15.2 | 8% | 22.8 | 12.0% |
| 460 | HIM | 13 | 1.0 | 8% | 1.6 | 12.0% |
| 465 | HTH | 9 | 0.5 | 6% | 0.9 | 10.0% |
| 470 | HIM | 29 | 1.2 | 4% | 2.3 | 8.0% |
| 480 | HIM | 85 | 8.5 | 10% | 11.9 | 14.0% |
| 490 | HIM | 266 | 26.6 | 10% | 37.2 | 14.0% |
| 495 | HIM | 47 | 1.9 | 4% | 3.7 | 8.0% |
| 510 | HIM | 66 | 2.7 | 4% | 5.3 | 8.0% |
| 605 | HTH | 26 | 2.1 | 8% | 3.2 | 12.0% |
| 610 | HIM | 48 | 3.8 | 8% | 5.8 | 12.0% |
| 615 | Fuels Only | 182 | 7.3 | 4% | 7.3 | 4.0% |
| 620 | AltMist | 65 | 2.6 | 4% | 5.2 | 8.0% |
| 621 | Aspen | 43 | 1.7 | 4% | 3.5 | 8.0% |
| 625 | Fuels Only | 76 | 6.0 | 8% | 3.0 | 4.0% |
| 630 | HTH | 68 | 5.5 | 8% | 8.2 | 12.0% |
| 640 | HIM | 166 | 6.6 | 4% | 13.3 | 8.0% |
| 645 | HIM | 296 | 11.8 | 4% | 23.7 | 8.0% |
| 650 | AltMist | 58 | 2.3 | 4% | 4.6 | 8.0% |
| 655 | HTH | 178 | 14.2 | 8% | 21.4 | 12.0% |
| 660 | HIM | 14 | 0.6 | 4% | 1.1 | 8.0% |
| 665 | HTH | 214 | 21.4 | 10% | 30.0 | 14.0% |
| 670 | HIM | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 675 | HIM | 52 | 4.2 | 8% | 6.3 | 12.0% |
| 680 | HTH | 58 | 5.8 | 10% | 8.2 | 14.0% |
| 685 | AltMist | 121 | 7.2 | 6% | 12.1 | 10.0% |
| 690 | AltMist | 123 | 4.9 | 4% | 9.9 | 8.0% |
| 700 | HIM | 67 | 2.7 | 4% | 5.3 | 8.0% |
| 710 | HIM | 105 | 4.2 | 4% | 8.4 | 8.0% |
| 720 | HTH | 17 | 1.0 | 6% | 1.7 | 10.0% |
| 725 | HTH | 32 | 1.3 | 4% | 2.6 | 8.0% |
| 730 | HIM | 73 | 7.3 | 10% | 10.2 | 14.0% |
| 735 | AltMist | 67 | 2.7 | 4% | 5.4 | 8.0% |
| 740 | HIM | 339 | 27.1 | 8% | 40.6 | 12.0% |
| 745 | HIM | 168 | 13.5 | 8% | 20.2 | 12.0% |
| 750 | AltMist | 95 | 3.8 | 4% | 7.6 | 8.0% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[53] |
|---|---|---|---|---|---|---|
| 755 | AltMist | 106 | 4.3 | 4% | 8.5 | 8.0% |
| 765 | HTH | 408 | 16.3 | 4% | 32.7 | 8.0% |
| 770 | AltMist | 113 | 4.5 | 4% | 9.1 | 8.0% |
| 775 | AltMist | 235 | 23.5 | 10% | 32.9 | 14.0% |
| 785 | AltMist | 127 | 5.1 | 4% | 10.1 | 8.0% |
| 786 | HTH | 86 | 8.6 | 10% | 12.0 | 14.0% |
| 795 | HTH | 22 | 0.9 | 4% | 1.8 | 8.0% |
| 796 | HTH | 40 | 1.6 | 4% | 3.2 | 8.0% |
| 800 | AltMist | 69 | 4.2 | 6% | 6.9 | 10.0% |
| 805 | AltMist | 57 | 2.3 | 4% | 4.6 | 8.0% |
| 810 | HTH | 149 | 6.0 | 4% | 11.9 | 8.0% |
| 815 | HTH | 92 | 3.7 | 4% | 7.4 | 8.0% |
| 820 | AltMist | 164 | 6.5 | 4% | 13.1 | 8.0% |
| 825 | AltMist | 68 | 2.7 | 4% | 5.4 | 8.0% |
| 830 | HTH | 60 | 2.4 | 4% | 4.8 | 8.0% |
| 835 | HTH | 18 | 0.7 | 4% | 1.4 | 8.0% |
| 850 | AltMist | 27 | 2.2 | 8% | 3.3 | 12.0% |
| 855 | AltMist | 33 | 2.7 | 8% | 4.0 | 12.0% |
| 860 | HIM | 9 | 0.4 | 4% | 0.7 | 8.0% |
| 865 | HTH | 51 | 2.0 | 4% | 4.1 | 8.0% |
| 870 | HTH | 145 | 14.5 | 10% | 20.4 | 14.0% |
| 875 | HTH | 57 | 2.3 | 4% | 4.6 | 8.0% |
| 876 | HTH | 40 | 1.6 | 4% | 3.2 | 8.0% |
| 880 | HTH | 84 | 3.4 | 4% | 6.7 | 8.0% |
| 885 | AltMist | 30 | 1.2 | 4% | 2.4 | 8.0% |
| 890 | AltMist | 21 | 1.2 | 6% | 2.1 | 10.0% |
| 895 | AltMist | 92 | 9.2 | 10% | 12.9 | 14.0% |
| 905 | Fuels Only | 173 | 6.9 | 4% | 6.9 | 4% |
| 910 | Fuels Only | 47 | 1.9 | 4% | 1.9 | 4% |
| 925 | Fuels Only | 47 | 1.9 | 4% | 1.9 | 4% |
| 930 | Fuels Only | 199 | 7.9 | 4% | 7.9 | 4% |
| 935 | Fuels Only | 37 | 1.5 | 4% | 1.5 | 4% |
| 940 | HIM | 150 | 15.0 | 10% | 21.0 | 14.0% |
| 945 | HIM | 106 | 4.2 | 4% | 8.5 | 8.0% |
| 965 | HTH | 33 | 1.3 | 4% | 2.6 | 8.0% |
| 970 | Fuels Only | 49 | 2.0 | 4% | 2.0 | 4.0% |
| 975 | HTH | 41 | 1.6 | 4% | 3.3 | 8.0% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[53] |
|---|---|---|---|---|---|---|
| 980 | HTH | 37 | 1.5 | 4% | 3.0 | 8.0% |
| 1020 | Fuels Only | 86 | 3.4 | 4% | 3.4 | 4.0% |
| 1025 | HTH | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 1030 | HTH | 97 | 3.9 | 4% | 7.8 | 8.0% |
| 1040 | HIM | 28 | 2.2 | 8% | 3.4 | 12.0% |
| 1045 | HTH | 105 | 4.2 | 4% | 8.4 | 8.0% |
| 1050 | HIM | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 1051 | HIM | 7 | 0.7 | 10% | 1.0 | 14.0% |
| 1060 | HTH | 66 | 2.6 | 4% | 5.3 | 8.0% |
| 1065 | HTH | 102 | 10.2 | 10% | 14.2 | 14.0% |
| 1070 | HTH | 43 | 1.7 | 4% | 3.4 | 8.0% |
| 1080 | Fuels Only | 92 | 3.7 | 4% | 3.7 | 4.0% |
| 1085 | HTH | 70 | 2.8 | 4% | 5.6 | 8.0% |
| 1090 | HIM | 20 | 0.8 | 4% | 1.6 | 8.0% |
| 1095 | HTH | 74 | 4.4 | 6% | 7.4 | 10.0% |
| 1096 | HTH | 24 | 1.0 | 4% | 1.9 | 8.0% |
| 2000 | HTH | 72 | 5.8 | 8% | 8.6 | 12.0% |
| 2005 | HTH | 83 | 3.3 | 4% | 6.6 | 8.0% |
| 2010 | HTH | 38 | 1.5 | 4% | 3.0 | 8.0% |
| 3000 | Fuels Only | 219 | 8.7 | 4% | 8.7 | 4% |
| 3005 | Fuels Only | 138 | 5.5 | 4% | 5.5 | 4% |
| 3010 | Fuels Only | 127 | 5.1 | 4% | 5.1 | 4% |
| 3015 | Fuels Only | 127 | 5.1 | 4% | 5.1 | 4% |
| 3020 | Fuels Only | 206 | 8.3 | 4% | 8.3 | 4% |
| 3025 | Fuels Only | 142 | 5.7 | 4% | 5.7 | 4% |
| 3030 | Fuels Only | 37 | 1.5 | 4% | 1.5 | 4% |
| 3035 | Fuels Only | 20 | 0.8 | 4% | 0.8 | 4% |
| 3040 | Fuels Only | 55 | 2.2 | 4% | 2.2 | 4% |
| 3045 | Fuels Only | 18 | 0.7 | 4% | 0.7 | 4% |
| 3050 | Fuels Only | 107 | 4.3 | 4% | 4.3 | 4% |
| 3055 | Fuels Only | 5 | 0.2 | 4% | 0.2 | 4% |
| 3060 | Fuels Only | 91 | 3.7 | 4% | 3.7 | 4% |
| 3065 | Fuels Only | 144 | 5.8 | 4% | 5.8 | 4% |
| 3070 | Fuels Only | 68 | 2.7 | 4% | 2.7 | 4% |
| 3075 | Fuels Only | 15 | 0.6 | 4% | 0.6 | 4% |
| 3080 | Fuels Only | 43 | 1.7 | 4% | 1.7 | 4% |
| 3085 | Fuels Only | 14 | 0.6 | 4% | 0.6 | 4% |

| EIS Unit Number | Proposed Activity | Unit Acres | Existing Acres Detrimental Soil Conditions | Existing Percentage Detrimental Soil Conditions | Estimated Acres Detrimental Soil Conditions after Harvest | Estimated Percentage of Unit with Detrimental Soil Conditions after All Activities[53] |
|---|---|---|---|---|---|---|
| 3090 | Fuels Only | 14 | 0.6 | 4% | 0.6 | 4% |
| 3095 | Fuels Only | 41 | 1.6 | 4% | 1.6 | 4% |
| 4000 | Fuels Only | 16 | 0.6 | 4% | 0.6 | 4% |
| 4005 | Fuels Only | 7 | 0.3 | 4% | 0.3 | 4% |
| 4010 | Fuels Only | 27 | 1.1 | 4% | 1.1 | 4% |
| 4015 | Fuels Only | 13 | 0.5 | 4% | 0.5 | 4% |
| 4020 | Fuels Only | 60 | 2.4 | 4% | 2.4 | 4% |
| 4025 | Fuels Only | 8 | 0.3 | 4% | 0.3 | 4% |
| 4030 | Fuels Only | 78 | 3.1 | 4% | 3.1 | 4% |
| 4035 | Fuels Only | 153 | 6.1 | 4% | 6.1 | 4% |
| 4040 | Fuels Only | 146 | 5.8 | 4% | 5.8 | 4% |
| 4045 | Fuels Only | 80 | 3.2 | 4% | 3.2 | 4% |
| 4050 | Fuels Only | 292 | 11.7 | 4% | 11.7 | 4% |
| 4055 | Fuels Only | 108 | 4.3 | 4% | 4.3 | 4% |
| 4060 | Fuels Only | 63 | 2.5 | 4% | 2.5 | 4% |
| 4065 | Fuels Only | 14 | 0.5 | 4% | 0.5 | 4% |
| 4070 | Fuels Only | 62 | 2.5 | 4% | 2.5 | 4% |
| 4075 | Fuels Only | 42 | 1.7 | 4% | 1.7 | 4% |
| 4080 | Fuels Only | 11 | 0.4 | 4% | 0.4 | 4% |
| 4085 | Fuels Only | 79 | 3.2 | 4% | 3.2 | 4% |
| 4090 | Fuels Only | 6 | 0.3 | 4% | 0.3 | 4% |
| 4095 | Fuels Only | 393 | 15.7 | 4% | 15.7 | 4% |
| 5000 | Fuels Only | 58 | 2.3 | 4% | 2.3 | 4% |
| 5005 | Fuels Only | 55 | 2.2 | 4% | 2.2 | 4% |
| 5010 | Fuels Only | 9 | 0.4 | 4% | 0.4 | 4% |
| 5015 | Fuels Only | 39 | 1.6 | 4% | 1.6 | 4% |
| 5020 | Fuels Only | 18 | 0.7 | 4% | 0.7 | 4% |
| 5025 | Fuels Only | 19 | 0.8 | 4% | 0.8 | 4% |
| 5030 | Fuels Only | 22 | 0.9 | 4% | 0.9 | 4% |
| 5035 | Fuels Only | 408 | 16.3 | 4% | 16.3 | 4% |
| 5040 | Fuels Only | 46 | 1.8 | 4% | 1.8 | 4% |
| 5045 | Fuels Only | 35 | 1.4 | 4% | 1.4 | 4% |

# Appendix D –Potential Wilderness Inventory

**Background**
This document describes the process and rationale used to inventory for and identify potential wilderness areas within and near the Rim-Paunina project, Crescent Ranger District, Deschutes National Forest. The inventory is based on, and consistent with, criteria found at Forest Service Handbook (FSH) 1909.12 Ch. 71.

Each step of the inventory process is visually documented as a map (see map discussion below). These maps can be found at the end of this Appendix. The Forest Service used professional judgment and local knowledge regarding unique, site-specific conditions of each area being considered for placement in the inventory of potential wilderness areas.

Examples of typical situations that required applications of professional judgment included, but are not limited to:

1. Placement of Potential Wilderness Area (PWA) boundaries along permanent natural or semi-permanent human-made features such as ridges, streams, topographic breaks, past harvest, or forest roads to facilitate easy on the ground identification;
2. Whether to proceed through an isthmus (or pinch point) created between two roads or two harvest areas or place a PWA boundary across the isthmus; and
3. Whether to locate a PWA boundary around a peninsula or place the boundary through the peninsula.

The scope of this potential wilderness inventory included all acres contained within the project planning area boundary and lands outside the boundary sufficient to consider contiguous inventoried roadless areas, Oregon Cascades Recreation Area, adjacent wildernesses, adjacent federal lands, and acres immediately adjacent (within two miles) to the boundary that do not contain forest roads and substantially recognizable stumps. Polygons that met this situation were examined as an entire unit (both portions that occur inside and outside of the planning area) against the potential wilderness area criteria found at FSH 1909.12 Chapter 71.1.

**Potential Wilderness Areas (PWA)** Areas of potential wilderness identified using inventory procedures found in Forest Service Handbook (FSH) 1909.12 Chapter 71 are called potential wilderness areas. The inventory is conducted with the express purpose of identifying all lands that meet the criteria for being evaluated for wilderness suitability.

Potential wilderness areas are not a land designation decision, they do not imply or impart any particular level of management direction or protection, they are not an evaluation of potential wilderness (FSH 1909.12, Chapter 72), and lastly they are not preliminary administrative recommendations for wilderness designation (FSH 1909.12, Chapter 73). The inventory of potential wilderness does not change the administrative boundary of any inventoried roadless areas (IRAs), any congressionally established wilderness, or any forest plan management areas.

Typically, PWAs substantially overlap and/or are contiguous with inventoried roadless areas. PWAs may also be contiguous with designated wilderness. Some newly inventoried PWAs may be stand alone areas that were not identified as ‘roadless areas’ in Appendix C of the 1990 Deschutes Forest Plan and ‘inventoried roadless areas’ as identified in a set of maps in the 2001 Roadless Area Conservation Rule (RACR). PWAs overlap inventoried roadless areas only where those acres of

land are consistent with the inventory criteria (FSH 1909.12 Chapter 71) and may extend beyond IRA and wilderness boundaries consistent with inventory criteria.

**Methodology**

The inventory process was conducted through a sequence of Geographic Information System (GIS) analyses and application of professional judgment. The judgment applied was situational and instance by instance. In some cases field reconnaissance was utilized to verify and augment GIS corporate data for previously harvested areas and areas with evidence of old roads or skid trails.

Each map (Appendix map D-1, D-2, D-3, D-4, and D-5) documents the outcome of the application of specific inventory criteria. Inventory criteria were applied in a different order than appears in FSH 1909.12 Chapter 71 but all criteria were considered and accounted for as described below under the Map D1 – D-5 headings. Table 141 was used to account for and display all polygons as described in Map D-4. Map D-6 is a summary map that depicts all five maps on one map to aid the readers understanding of this inventory process.

**Forest Service Handbook 1909.12, Chapter 70**

To comply with requirements established in FSH 1909.12, Chapter 70, Wilderness Evaluation, the Forest Service is required to conduct an inventory to identify potential wilderness areas following the criteria found in Chapter 71.1. The inventory is conducted to assess whether project related actions have impacts on the ability of an undeveloped area to be considered in a future potential wilderness inventory. In an effort to streamline the inventory and analysis, a Geographic Information System (GIS) model was built considering corporate data in Forest Service Activity Tracking System (FACTS) and INFRA (short for infrastructure for an integrated data management system) to draw information regarding past tree cutting activities and to identify roads, major elements to be considered while conducting an inventory. The process is composed of GIS analysis with validation of the model utilizing satellite imagery, local knowledge, field reconnaissance, and or a combination of the above. The GIS model produces a preliminary layer of polygons without past tree cutting activities and outside of a road effect area. A road effect is defined as an area adjacent to the road where impacts from firewood cutting, danger tree removal, brushing and other road maintenance activities have most likely occurred considering topography, vegetative conditions, and soil characteristics. Further site specific analysis is needed, polygon by polygon, to make a final determination if the polygon meets the criteria established in Chapter 71.1. The model also includes tables for data entry to capture the disposition of each polygon on whether it meets the criteria for inclusion in the potential wilderness inventory. It should be noted that wilderness evaluation is not to be conducted with this analysis, only the inventory.

**Analytical Process Utilizing the PWA Inventory GIS tool**

Geographic Information System (GIS) experts run the model with assistance from planners utilizing site specific project boundaries. Specific instructions for running the model, including metadata is attached to this document for use by GIS specialists. Each step of the analysis produced a corresponding map and these maps are described along with the corresponding step in the analysis process that helped create it.

**Step 1 – Determines federal ownership within the analysis area**

This step removes all private and other non-federal ownership from the Potential Wilderness Area (PWA) analysis. The model ran data on the Rim-Paunina project boundary and added a two mile buffer to help identify all Federal lands and other federal land ownership adjacent to the PWA analysis area. The Fremont-Winema National Forest Lands were added to the inventory area within this buffer due to their proximity/adjacency to the Rim-Paunina area on the Crescent Ranger District. By including the buffer of adjacent federal lands it allows larger polygons outside the project boundary to be analyzed. In addition, if the project boundary is adjacent to Inventoried Roadless Areas or other predominately undeveloped

areas, the analysis area may need to be expanded to cover a two mile buffer around these areas to capture the entire polygon and potential adjacent undeveloped areas that could meet PWA criteria.

**Map D-1**
Map D-1, which displays existing conditions of the Rim-Paunina project planning boundary, the two mile buffer, and forest roads. The planning area is approximately 40,000 acres.

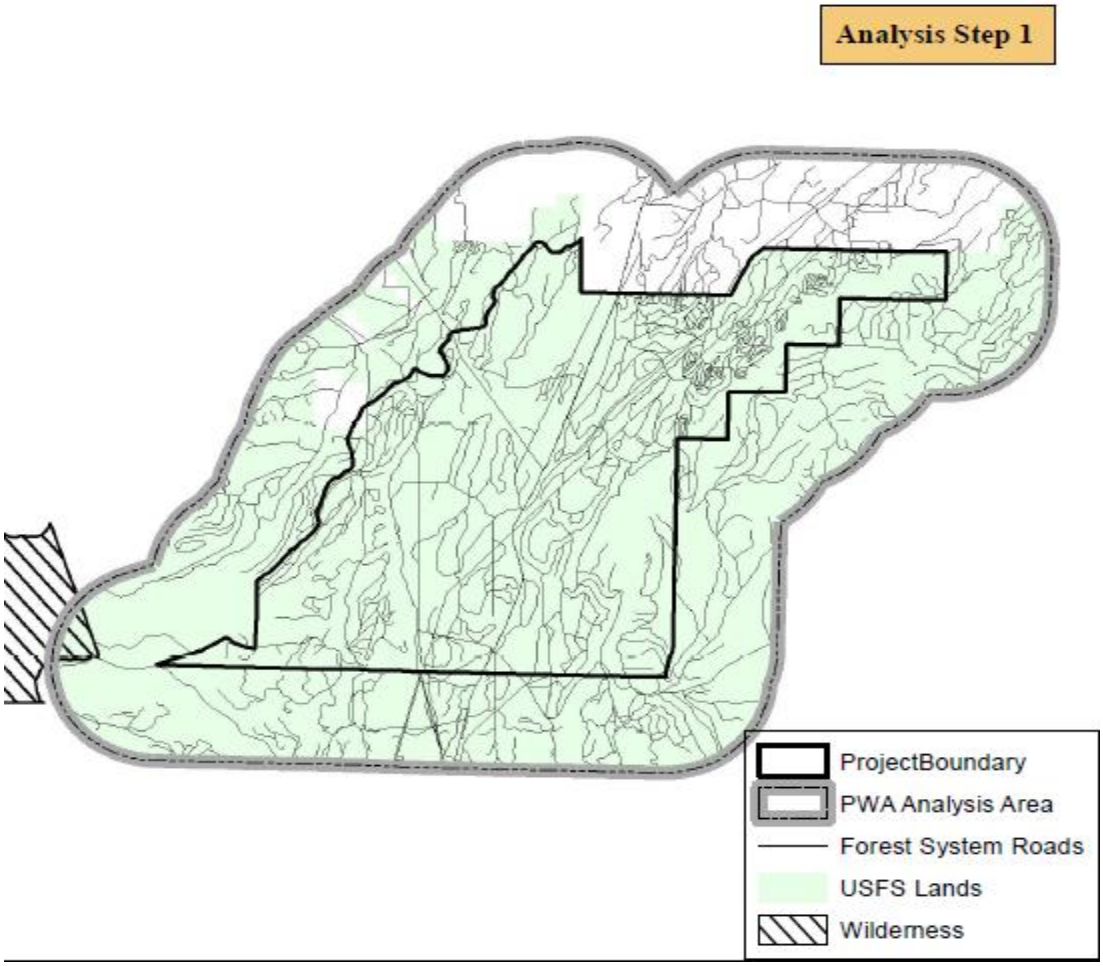


**Figure 68. Map D-1 Removal of Non-Federal Lands**

**Step 2 – Determines "Stump Producing Activities"**
Data stored in the Forest Service Activity Tracking System (FACTS) data base for the Crescent Ranger District as well as any timber sale polygons from sales prior to the inception of FACTS to record timber sale data was utilized to remove polygons that had evidence of past harvest/stump producing activities (FACTS looks at codes that infer tree cutting activities have taken place in the past). FACTS and timber sale polygons from the Fremont-Winema National Forests were also taken into account and polygons from the Fremont-Winema that showed evidence of for removal of stump producing/past harvest activities or roads were removed from further examinations (FSH 1909.12 Chapter 71 Section 11(9)).

**Map D-2**

Map D-2 displays the Rim-Paunina project planning boundary, forest roads and past harvest activities. The entire planning area was overlain with the district's GIS harvest layer which displays locations of timber harvest over the past 60 years. Past timber harvest included activities from clear-cuts to thinning units. The past timber harvest layer also includes lands where local knowledge and field visits were utilized to verify past timber harvest (notes and pictures from field verification can be found in the Rim-Paunina project record). In all cases, past timber harvest resulted in features such as stumps, skid trails etc. which are evident; therefore, all acres (approximately 36,577 acres) depicted in this map do not meet FSH 1909.12 Chapter 71 Section 11(9) inventory criteria and would be removed from the inventory in Map D-3.

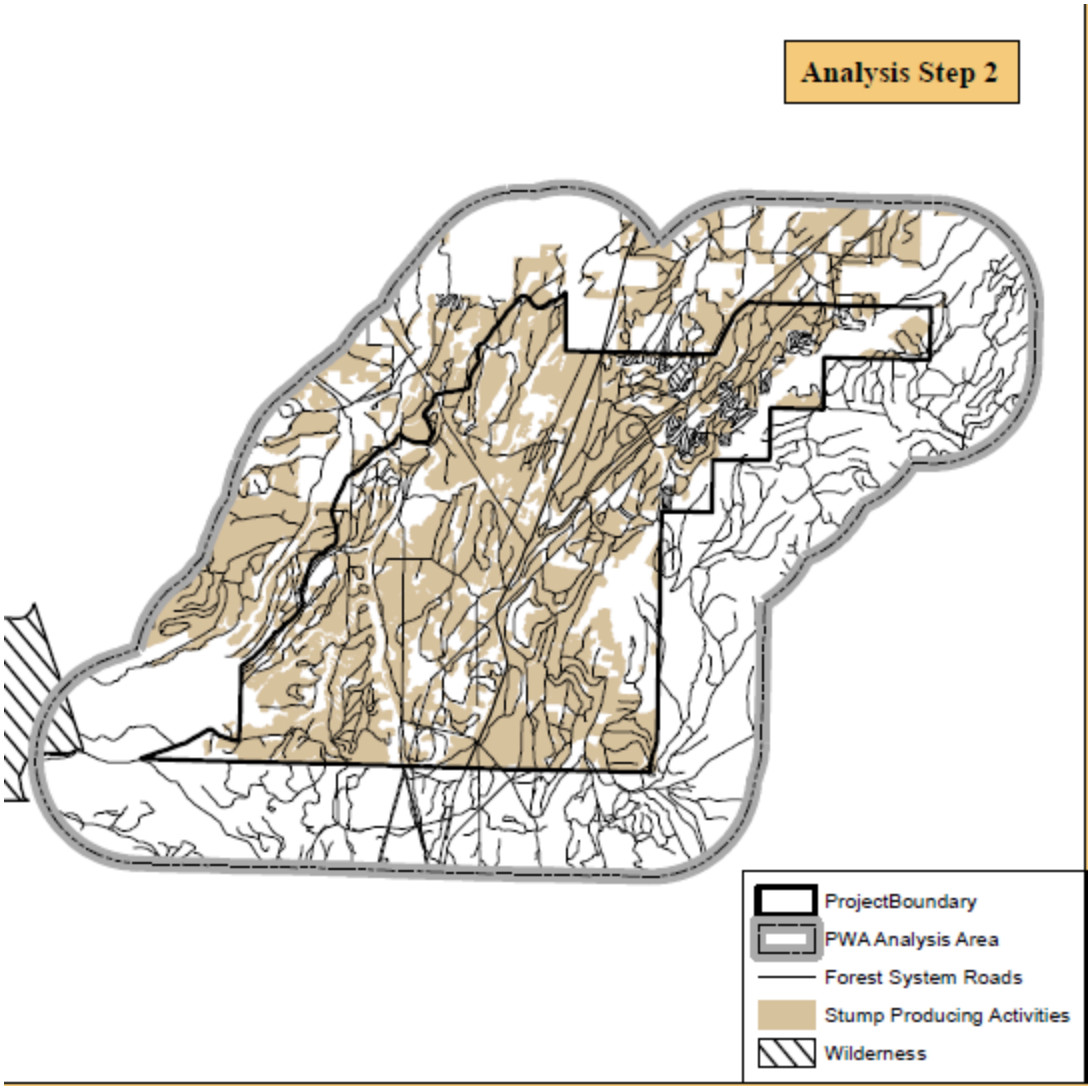


**Figure 69. Map D-2 Removes Stump Producing Activity**

**Step 3 – Determines "Road effect area"**
Data stored in the INFRA (short for infrastructure for an integrated data management system) database was utilized to identify all system and non-system roads, including closed roads and decommissioned roads within and adjacent to the Rim-Paunina project area. On the Deschutes, it is estimated that because of previous danger tree removal, firewood cutting, and other roadside harvest activities, the area along the roads would not meet the criteria for inclusion in the wilderness inventory. Not all roadsides have been impacted with activities but local knowledge of firewood cutting activities, tree heights, and to facilitate easier analysis, it was estimated that within 300 feet each side of the road contained elements that would preclude inclusion in the potential wilderness inventory. These same criteria were applied to the Fremont-Winema National Forests roads layer that was utilized, especially in the two mile buffer, to help define areas along the roads that would not meet the criteria for inclusion in the wilderness inventory.

**Map D-3**
Map D-3 displays the Rim-Paunina project planning boundary; forest roads; acres with evidence of recognizable stumps, skid trails, and uneven canopy closure. The entire planning area was overlain with the district's GIS forest roads layer. Forest roads have associated permitted uses and maintenance. Road maintenance and many permitted uses have removed trees and created visible stumps in the corridor. These activities are expected to continue into the future.

During initial road construction trees were felled within a clearing limit to provide for safe and efficient construction and future operational safety of road users. Clearing distances away from the edge of a road varied by many factors including tree height, topographic slope, and other factors. Past clearing of trees along forest roads created stumps that are evident and recognizable.

Road maintenance occurs to varying degrees along each road according to an assigned maintenance level and available funding. Road maintenance includes the periodic clearing of brush and the falling of danger trees that present a hazard to forest visitors, employees, and contractors as defined by the Region 6 Danger Tree Policy (2007). The distance of the hazard removal away from a road varies by tree height, topographic slope, and other factors. Past removal of danger trees along forest roads created stumps that are evident and recognizable.

We recognize stumps are not present along every mile of forest road; for example roads adjacent to a meadow, talus, lava beds, or a lake. The judgment we applied in setting a PWA boundary balanced inventory criteria regarding excluding past harvest and facilitating easy on-the-ground identification.

Based on local knowledge, and professional judgment regarding the evidence of recognizable stumps, skid trails, etc. which occur to varying degrees adjacent to forest roads (as described above) and to facilitate easy on-the-ground identification of a uniform, measurable boundary along a semi-permanent, human-made feature; the boundary was set as 300 feet each side of the forest road.

This boundary is fully consistent with and supported by the following inventory criteria.

- FSH 1909.12 at Chapter 71.1(3); potential wilderness areas do not contain forest roads therefore all acres that are a forest road will be removed from the inventory in Map D-4.
- FSH 1909.12 at Chapter 71.1(9); acres with evidence of past logging and roads will be removed from the inventory in Map D-4.
- FSH 1909.12, at Chapter 71; locate potential wilderness area boundaries at semi-permanent, human-made features to facilitate easy on-the-ground identification of a boundary.

Therefore, highlighted acres along forest roads (approximately 25,932 acres) in Map D-3 would be removed from the inventory in Map D-4.

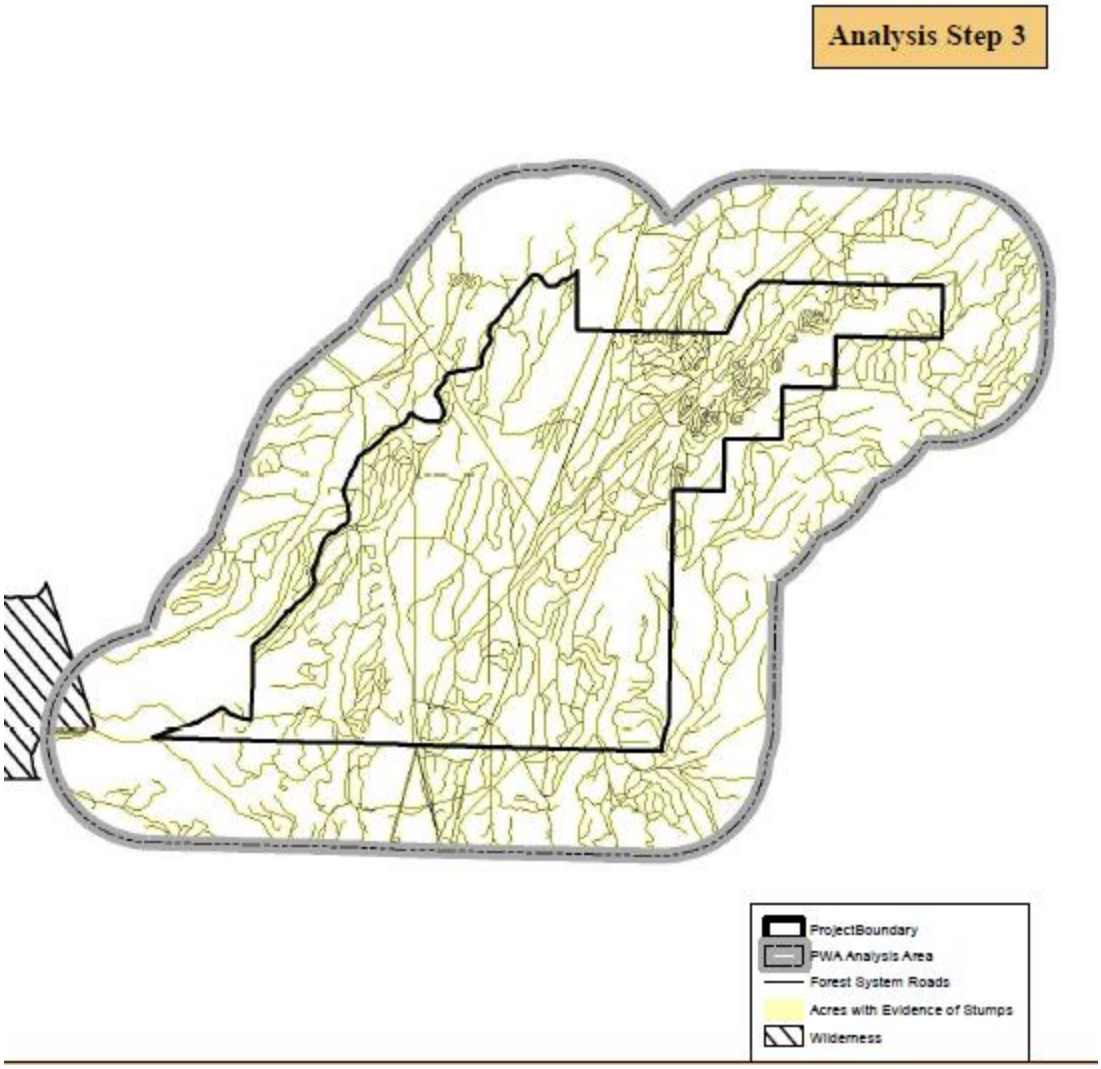


**Figure 70. Map D-3 Removes Areas Adjacent to Roads with Evidence of Stumps**

**Step 4 – Determines the Preliminary Potential Wilderness Areas**

The GIS model incorporates results from the previous steps and identifies polygons with no past tree cutting and outside the road effect area. Each polygon is numbered to be able to track the polygon through its entire disposition. This is the preliminary step to identification of the potential wilderness area within the analysis area. The Interdisciplinary Team (IDT) reviews the status of the polygons and validates the data depicted on the maps and tables generated by the GIS tool. It's important to utilize local knowledge to determine if the GIS model has captured all data needed to finalize the inventory. A final determination is made for each polygon based on the inventory criteria in FSH 1909.12 Chapter 71, to include the polygon in the potential wilderness inventory or not.

Many different things are considered when the Interdisciplinary Team looked at each polygon. They considered whether or not the area contained roads, showed evidence of past harvest activities, did all the land belong to the federal government or a was some owned by a private entity, did all the layers of data get brought into the model (FACTS, timber polygons used before FACTS came into being), were there any recently signed NEPA decisions that would include harvest activities in any of these areas, was aerial photography and satellite imagery brought in, was there any local knowledge of past harvest activities not already incorporated, was the adjacent National Forest layers brought in for roads, logging

activity etc. and was a review of the potential wilderness inventory categories (FSH 1909.12 chap 71.1) conducted to see if any apply?

Polygon data was evaluated against satellite imagery and aerial photographs to additionally find areas inconsistent with GIS corporate data. Local knowledge of historical timber sales (over 20 years ago) and a land exchange with Crown Pacific in the late 1990's resulted in the need for field verification as much of Crown Pacific's land was heavily harvested in the past and an accurate on-the-ground accounting was necessary.

**Map D-4**

Map D-4 displays the Rim-Paunina project planning boundary, forest roads, and acres that do not contain evidence of past harvest or forest roads. Approximately four hundred forty seven (447) individual polygons were evaluated. Two individual polygons less than one acre in size were eliminated from further study. The removal of these polygons resulted in four hundred forty five (445) individual polygons, ranging in size from one acre to approximately 2,545 acres, covering 30,020 acres.

Map 4 displays 445 polygons, each with its own unique, numeric identifier. Five polygons did meet the inventory criteria at (FSH) 1909.12 chapter 71.1 and will be discussed below. The remaining polygons do not have substantially recognizable stumps, do not contain forest roads, and each polygon boundary is greater than or equal to 300 feet from a forest road. Individual polygons are part of a larger ecosystem and none are separate, self-contained ecosystems, such as found on an island surrounded by water. None of the four hundred forty polygons can be separately preserved due to a physical terrain or a natural condition in part because of their small size and in part because they are each part of a larger, overall continuous ecosystem condition distributed throughout and beyond the project area. Based on the discussion above, local knowledge, and professional judgment none of these individual polygons met inventory criteria at 71.1 2a, 2b, or 2c and therefore would not be brought forward as potential wilderness areas.

None of the four hundred forty five polygons (445) are contiguous with inventoried roadless areas as the closest inventoried roadless area is four miles to the southwest (Mount Thielsen IRA on the Fremont-Winema National Forest, or 15 miles to the northwest Maiden Peak IRA (see Figure 56).

Three polygons (147, 237, and 444) are contiguous with Mount Thielsen Wilderness Area. Polygon 147 also shares part of a border with the Oregon Cascades Recreation Area. These polygon acres generally met criteria 71.1 (2c) however, some contiguous acres were removed from the inventory based on professional judgment when locating a boundary at a prominent natural or semi-permanent human-made feature to facilitate easy on-the-ground identification. When this occurred, new polygons were made and added to the analysis of other remaining undeveloped lands (polygon 445). The Forest Service interpreted '*prominent natural or semi-permanent human-made*' to include features such as, but not limited to, topographic breaks, streams, ridges, vegetative breaks, and the existing administrative boundaries. These judgments are documented in Table 141 and associated maps/documents in the potential wilderness portion of the Rim-Paunina project file. The remaining contiguous acres are retained in the inventory and are displayed in Map D-5 and in Table 141.

The current model in GIS is set up to query FACTS from the Deschutes National Forest only. Although not displayed on Map D-2 (the remove stump producing activities map) the Chemult District FACTS layer and timber sale polygons were brought in as the south and east portions of the project area borders the Fremont-Winema National Forests and are displayed on Map D-4. Polygon 75 appears contiguous to the Mt. Thielsen Wilderness but is separated by and includes Forest Service road 5840 and spurs as well as evidence of harvest activities once the Chemult timber sale polygons were included.

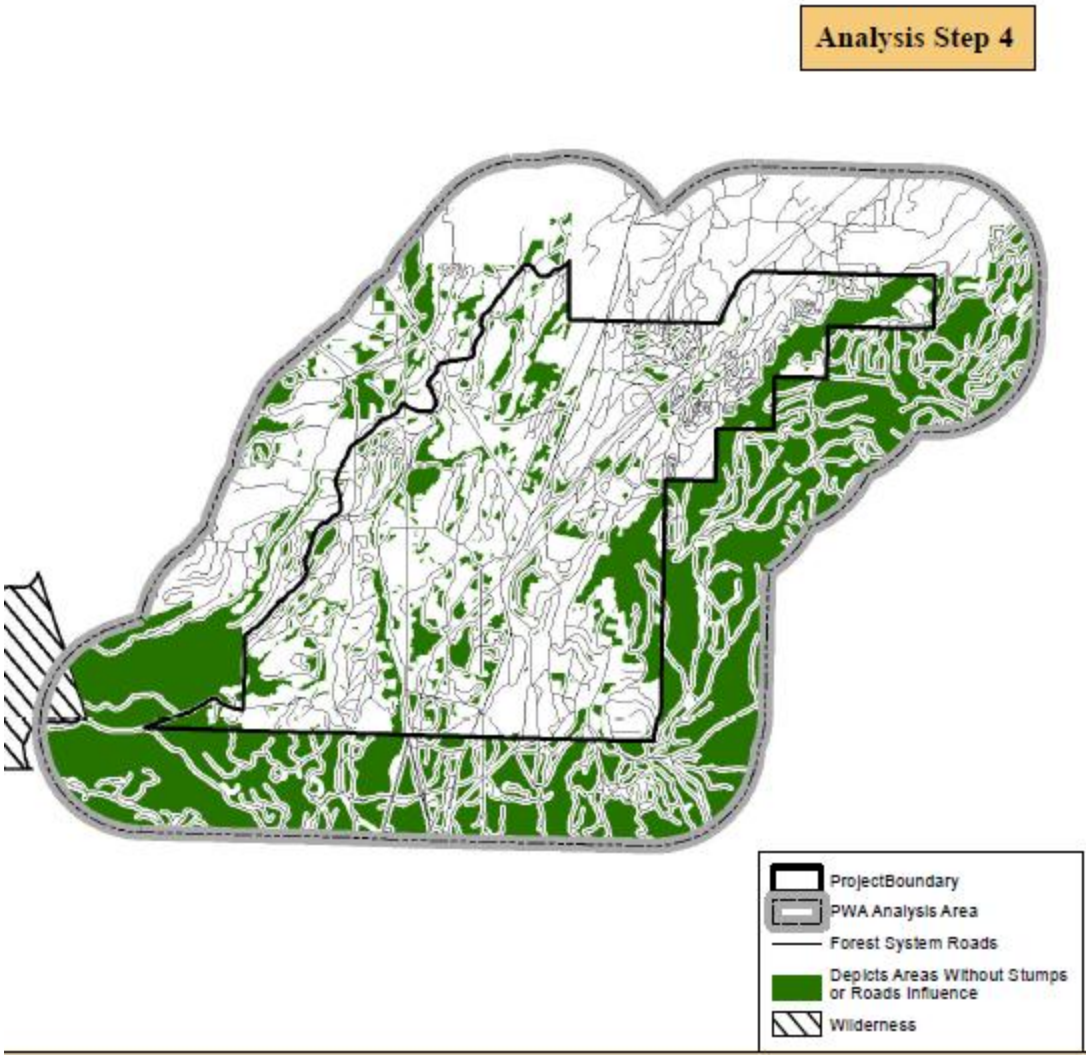


**Figure 71. Map D-4 Depicts Acres not Containing Evidence of Stumps or Roads**

**Step 5 – Final Potential Wilderness Area Inventory**

At this step, the Interdisciplinary Team (IDT) reviews the status of the polygons and validates the data depicted on the maps and tables generated by the GIS tool. It's important to utilize local knowledge to determine if the GIS model has captured all data needed to finalize the inventory. A final determination is made for each polygon based on the inventory criteria, to include the polygon in the inventory or not.

- Final Determination of Potential Wilderness Area Inventory - Utilize 1909.12 Chapter 71 to determine if polygons meet or fail to meet the criteria for consideration during the PWA inventory process (reference criteria 1,2a, 2b, 2c and 3 in Table 141).

**Map D-5**

Map D-5 displays the Forest Service's completed inventory of potential wilderness areas within and adjacent to the Rim-Paunina project planning area. The five potential wilderness areas included in the inventory are Polygons 147, 219, 237, 405 and 444. Polygons 147, 237, and 444 containing 3,237 acres are all outside the project boundary and no activities are planned in them, but would be included in the inventory as they are contiguous to the Mt. Thielsen Wilderness. Polygons 219 and 405 (along Walker Rim) include approximately 2,781 acres with about 2,148 acres within the Rim-Paunina project boundary

and 633 acres outside the project boundary on the Fremont-Winema National Forests. Aerial photographs from the National Agriculture Imagery Program (NAIP) were utilized and overlaid with harvest unit polygons to look for evidence of stumps and roads. Boundaries and smaller polygons along the north and west edges of polygons 219 and 405 were field verified as there were several parcels of land obtained in a Crown Pacific land exchange in the late 1990's in this vicinity along Walker Rim. This resulted in the removal of several polygons from being included in the inventory as there was evidence of past harvest activities (Table 141). Polygons 219 and 405 as amended would be included in the inventory as displayed in Map D-5.

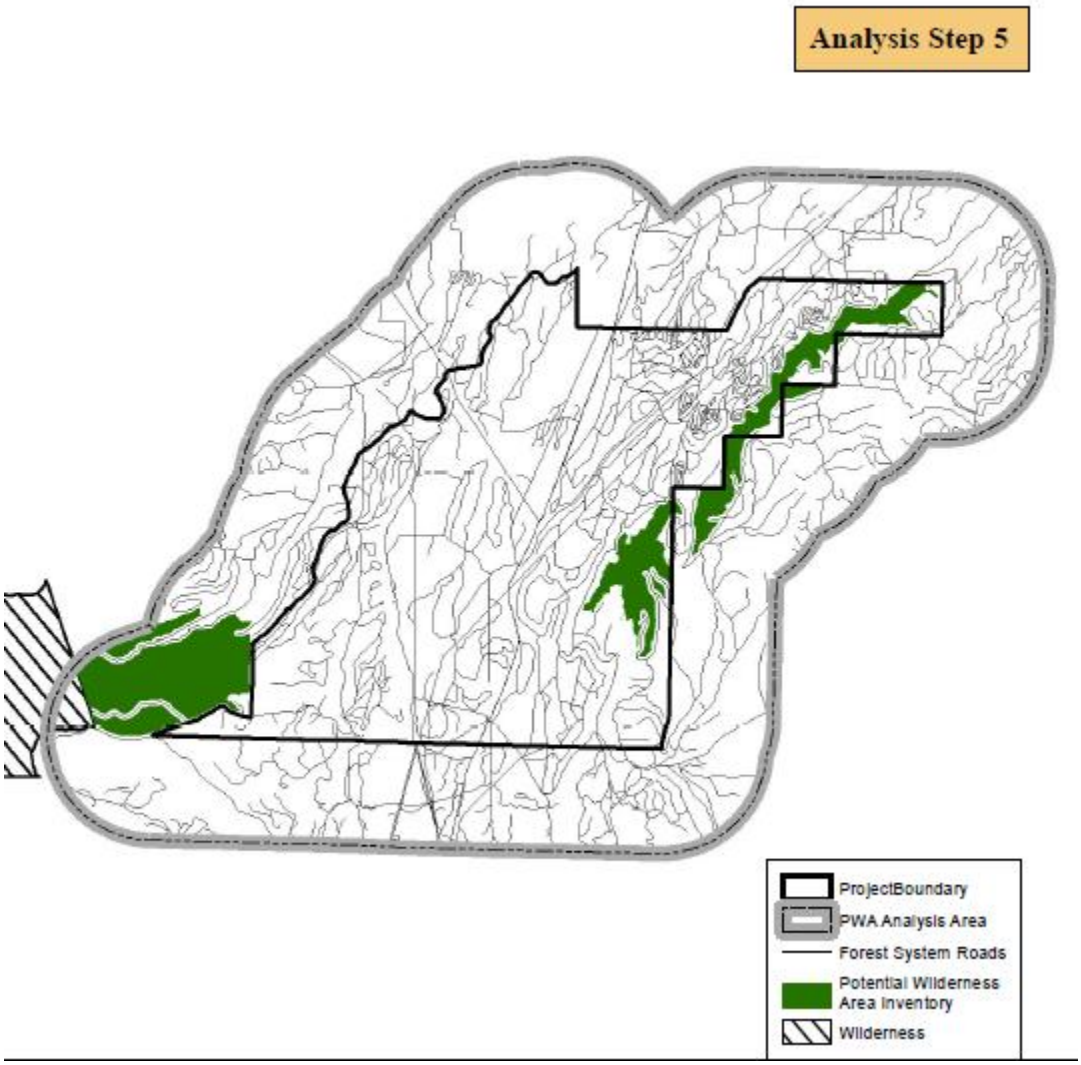


**Figure 72. Map D-5 Potential Wilderness Inventory Acres**

**Table 140. Summary of Potential Wilderness Acres Removed by each Analysis Step**

| Potential Wilderness Area Acreage Summary | |
|---|---|
| Total acres inventoried | 103,908 |
| Map D-2 acres removed from inventory | 36,577 |
| Map D-3 acres removed from inventory | 25,932 |
| Map D-4 acres removed from inventory | 31,020 |
| Map D-5 acres of Potential Wilderness Areas within the Rim-Paunina project planning area | 6,018 |

### Map D-6 - Potential Wilderness Inventory polygons

Map D-6 is a summary map that displays the results of all five maps. These maps are described along with the corresponding step in the analysis process that helped to create it.

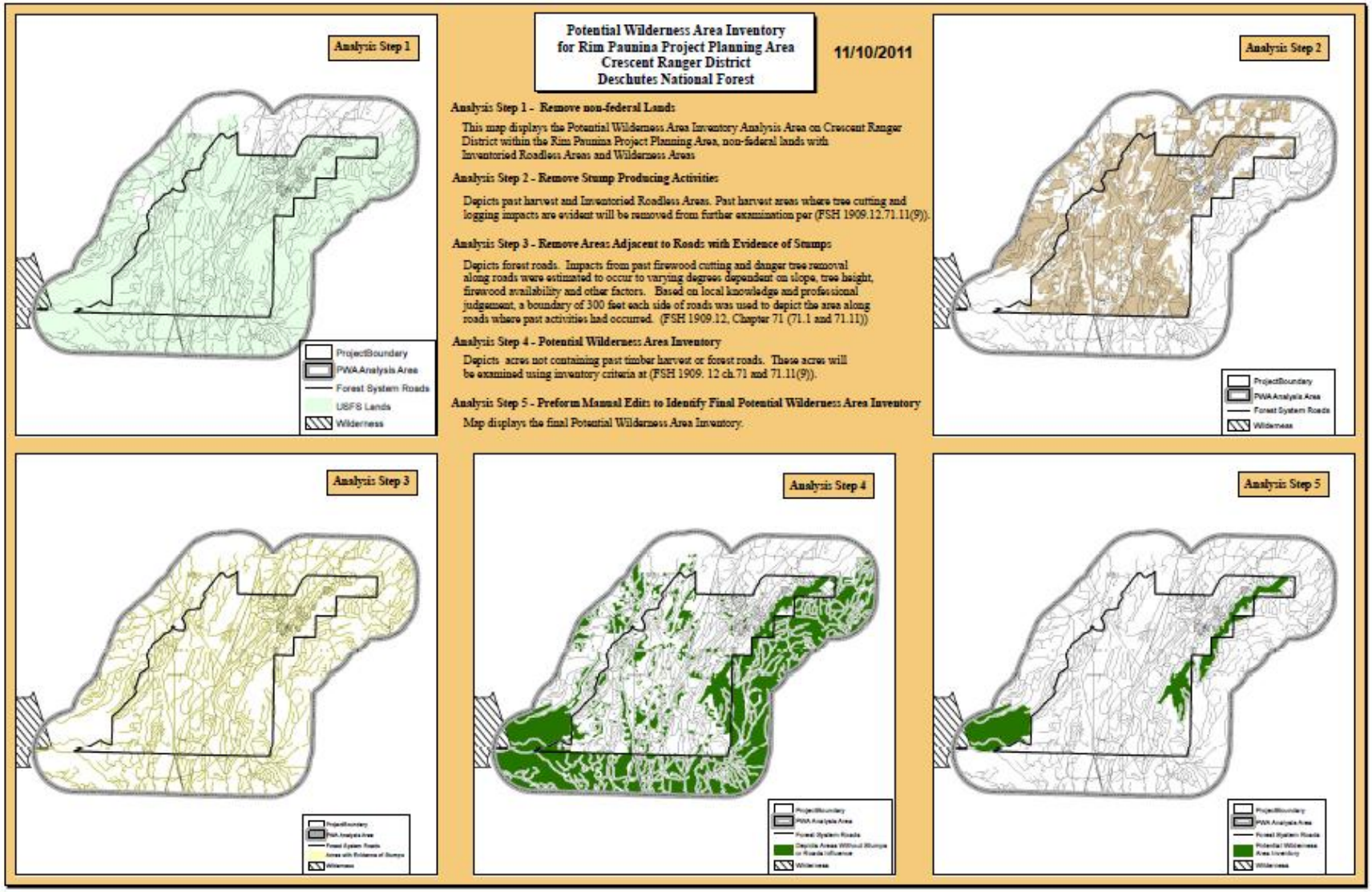


**Figure 73. Map D-6 Overview of All Five Maps Depicting Analysis Steps One to Five to Reach Potential Wilderness Area Inventory in Rim-Paunina Project Area**

**Table 141. Rim-Paunina Potential Wilderness Inventory- Polygon by Polygon**

| Rim-Paunina Potential Wilderness Inventory |
|---|
| The following inventory for the Rim-Paunina Project planning area was created using the inventory criteria found in Forest Service Handbook (FSH) 1909.12 chapter 71.1. Each polygon from D-6 (described above) was examined against the criteria from FSH 1909.12 Chapter 71. Areas must meet Criteria 1 and 3 or 2 and 3 to be included in the potential wilderness inventory.<br><br>**(1)** Area is more than 5,000 acres in size<br>**(2)** Area contains less than 5,000 acres, but can meet one or more of the following criteria:<br>**2a.** Area can be preserved due to physical terrain and natural conditions<br>**2b.** Areas are self-contained ecosystems, such as islands, that can be effectively managed as a separate unit of the national Wilderness Preservation System<br>**2c.** Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.<br>**3.** Areas do not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian (section 71.12)<br><br>The Forest Service relied on local knowledge and judgment regarding unique, site-specific conditions of each area being considered for placement on the inventory of potential wilderness. When delineating areas for potential wilderness inventory; boundaries were located using prominent natural or semi-permanent human-made features to facilitate easy on-the-ground identification.<br><br>**Note 1**: The following narrative is a comment that applies to all 445 polygons (except polygons 147, 219, 237, 405, and 444) in Table 141. 'This individual polygon displayed on Map D-4 is part of a larger ecosystem and is not a separate, self-contained ecosystem, such as found on an island surrounded by water. This polygon cannot be separately preserved due to physical terrain or natural condition because of the small size and shape of this polygon in relation to the setting of its physical terrain. While there are no roads or past timber harvest evident in this polygon, this condition alone is not a sole indication of a natural condition. For example, policies over the past 50 years have excluded fire disturbance from much of the area surrounding this polygon creating a context of uncharacteristic or un-natural conditions. In addition, this individual polygon cannot be effectively managed as a separate unit of the National Wilderness Preservation System.' |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 7 | No | No | No | No | |
| 2 | 2 | 7 | No | No | No | No | |
| 3 | 3 | 6 | No | No | No | No | |
| 4 | 4 | 28 | No | No | No | No | |
| 5 | 5 | 16 | No | No | No | No | |
| 6 | 6 | 41 | No | No | No | No | |
| 7 | 7 | 30 | No | No | No | No | |
| 8 | 8 | 14 | No | No | No | No | |
| 9 | 9 | 15 | No | No | No | No | |
| 10 | 10 | 36 | No | No | No | No | |
| 11 | 11 | 270 | No | No | No | No | |
| 12 | 12 | 53 | No | No | No | No | |
| 13 | 13 | 275 | No | No | No | No | |
| 14 | 14 | 124 | No | No | No | No | |
| 15 | 15 | 291 | No | No | No | No | |
| 16 | 16 | 159 | No | No | No | No | |
| 17 | 17 | 17 | No | No | No | No | |
| 18 | 18 | 9 | No | No | No | No | |
| 19 | 19 | 420 | No | No | No | No | |
| 20 | 20 | 99 | No | No | No | No | |
| 21 | 21 | 3 | No | No | No | No | |
| 22 | 22 | 7 | No | No | No | No | |
| 23 | 23 | 172 | No | No | No | No | |
| 24 | 24 | 4 | No | No | No | No | |
| 25 | 25 | 359 | No | No | No | No | |
| 26 | 26 | 23 | No | No | No | No | |
| 27 | 27 | 2 | No | No | No | No | |
| 28 | 28 | 15 | No | No | No | No | |
| 29 | 29 | 27 | No | No | No | No | |
| 30 | 30 | 15 | No | No | No | No | |
| 31 | 31 | 3 | No | No | No | No | |
| 32 | 32 | 12 | No | No | No | No | |
| 33 | 33 | 362 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 34 | 34 | 4 | No | No | No | No | |
| 35 | 35 | 34 | No | No | No | No | |
| 36 | 36 | 1 | No | No | No | No | |
| 37 | 37 | 15 | No | No | No | No | |
| 38 | 38 | 13 | No | No | No | No | |
| 39 | 39 | 120 | No | No | No | No | |
| 40 | 40 | 34 | No | No | No | No | |
| 41 | 41 | 103 | No | No | No | No | |
| 42 | 42 | 10 | No | No | No | No | |
| 43 | 43 | 37 | No | No | No | No | |
| 44 | 44 | 88 | No | No | No | No | |
| 45 | 45 | 1 | No | No | No | No | |
| 46 | 46 | 193 | No | No | No | No | |
| 47 | 47 | 22 | No | No | No | No | |
| 48 | 48 | 5 | No | No | No | No | |
| 49 | 49 | 6 | No | No | No | No | |
| 50 | 50 | 113 | No | No | No | No | |
| 51 | 51 | 6 | No | No | No | No | |
| 52 | 52 | 3 | No | No | No | No | |
| 53 | 53 | 83 | No | No | No | No | |
| 54 | 54 | 8 | No | No | No | No | |
| 55 | 55 | 12 | No | No | No | No | |
| 56 | 56 | 2 | No | No | No | No | |
| 57 | 57 | 8 | No | No | No | No | |
| 58 | 58 | 76 | No | No | No | No | |
| 59 | 59 | 73 | No | No | No | No | |
| 60 | 60 | 32 | No | No | No | No | |
| 61 | 61 | 35 | No | No | No | No | |
| 62 | 62 | 14 | No | No | No | No | |
| 63 | 63 | 5 | No | No | No | No | |
| 64 | 64 | 7 | No | No | No | No | |
| 65 | 65 | 63 | No | No | No | No | |
| 66 | 66 | 500 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 67 | 67 | 6 | No | No | No | No | |
| 68 | 68 | 175 | No | No | No | No | |
| 69 | 69 | 15 | No | No | No | No | |
| 70 | 70 | 75 | No | No | No | No | |
| 71 | 71 | 27 | No | No | No | No | |
| 72 | 72 | 5 | No | No | No | No | |
| 73 | 73 | 1 | No | No | No | No | |
| 74 | 74 | 5 | No | No | No | No | |
| 75 | 75 | 2,345 | No | No | No | No | Separated by 5840 road from Wilderness and evidence of stumps and roads when the Fremont-Winema Chemult District timber harvest polygons were brought in. |
| 76 | 76 | 25 | No | No | No | No | |
| 77 | 77 | 1 | No | No | No | No | |
| 78 | 78 | 2 | No | No | No | No | |
| 79 | 79 | 2 | No | No | No | No | |
| 80 | 80 | 592 | No | No | No | No | |
| 81 | 81 | 49 | No | No | No | No | |
| 82 | 82 | 5 | No | No | No | No | |
| 83 | 83 | 35 | No | No | No | No | |
| 84 | 84 | 27 | No | No | No | No | |
| 85 | 85 | 5 | No | No | No | No | |
| 86 | 86 | 20 | No | No | No | No | |
| 87 | 87 | 6 | No | No | No | No | |
| 88 | 88 | 1,619 | No | No | No | No | |
| 89 | 89 | 37 | No | No | No | No | |
| 90 | 90 | 22 | No | No | No | No | |
| 91 | 91 | 11 | No | No | No | No | |
| 92 | 92 | 8 | No | No | No | No | |
| 93 | 93 | 1 | No | No | No | No | |
| 94 | 94 | 2 | No | No | No | No | |
| 95 | 95 | 21 | No | No | No | No | |
| 96 | 96 | 2 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 97 | 97 | 1 | No | No | No | No | |
| 98 | 98 | 10 | No | No | No | No | |
| 99 | 99 | 4 | No | No | No | No | |
| 100 | 100 | 26 | No | No | No | No | |
| 101 | 101 | 2 | No | No | No | No | |
| 102 | 102 | 3 | No | No | No | No | |
| 103 | 103 | 3 | No | No | No | No | |
| 104 | 104 | 61 | No | No | No | No | |
| 105 | 105 | 22 | No | No | No | No | |
| 106 | 106 | 24 | No | No | No | No | |
| 107 | 107 | 4 | No | No | No | No | |
| 108 | 108 | 46 | No | No | No | No | |
| 109 | 109 | 214 | No | No | No | No | |
| 110 | 110 | 7 | No | No | No | No | |
| 111 | 111 | 31 | No | No | No | No | |
| 112 | 112 | 9 | No | No | No | No | |
| 113 | 113 | 6 | No | No | No | No | |
| 114 | 114 | 22 | No | No | No | No | |
| 115 | 115 | 3 | No | No | No | No | |
| 116 | 116 | 8 | No | No | No | No | |
| 117 | 117 | 1 | No | No | No | No | |
| 118 | 118 | 3 | No | No | No | No | |
| 119 | 119 | 2 | No | No | No | No | |
| 120 | 120 | 1 | No | No | No | No | |
| 121 | 121 | 4 | No | No | No | No | |
| 122 | 122 | 2 | No | No | No | No | |
| 123 | 123 | 149 | No | No | No | No | |
| 124 | 124 | 1 | No | No | No | No | |
| 125 | 125 | 128 | No | No | No | No | |
| 126 | 126 | 37 | No | No | No | No | |
| 127 | 127 | 3 | No | No | No | No | |
| 128 | 128 | 12 | No | No | No | No | |
| 129 | 129 | 5 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 130 | 130 | 2 | No | No | No | No | |
| 131 | 131 | 27 | No | No | No | No | |
| 132 | 132 | 61 | No | No | No | No | |
| 133 | 133 | 12 | No | No | No | No | |
| 134 | 134 | 16 | No | No | No | No | |
| 135 | 135 | 2 | No | No | No | No | |
| 136 | 136 | 5 | No | No | No | No | |
| 137 | 137 | 39 | No | No | No | No | |
| 138 | 138 | 6 | No | No | No | No | |
| 139 | 139 | 1 | No | No | No | No | |
| 140 | 140 | 2 | No | No | No | No | |
| 141 | 141 | 6 | No | No | No | No | |
| 142 | 142 | 9 | No | No | No | No | |
| 143 | 143 | 3 | No | No | No | No | |
| 144 | 144 | 3 | No | No | No | No | |
| 145 | 145 | 25 | No | No | No | No | |
| 146 | 146 | 1,077 | No | No | No | No | |
| 147 | 147 | 328 | No | No | No | **Yes** | Contiguous to Mt. Thielsen Wilderness. Added to inventory |
| 148 | 148 | 4 | No | No | No | No | |
| 149 | 149 | 5 | No | No | No | No | |
| 150 | 150 | 36 | No | No | No | No | |
| 151 | 151 | 47 | No | No | No | No | |
| 152 | 152 | 437 | No | No | No | No | |
| 153 | 153 | 1 | No | No | No | No | |
| 154 | 154 | 4 | No | No | No | No | |
| 155 | 155 | 39 | No | No | No | No | |
| 156 | 156 | 2 | No | No | No | No | |
| 157 | 157 | 191 | No | No | No | No | |
| 158 | 158 | 11 | No | No | No | No | |
| 159 | 159 | 3 | No | No | No | No | |
| 160 | 160 | 2 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 161 | 161 | 17 | No | No | No | No | |
| 162 | 162 | 2 | No | No | No | No | |
| 163 | 163 | 2 | No | No | No | No | |
| 164 | 164 | 6 | No | No | No | No | |
| 165 | 165 | 5 | No | No | No | No | |
| 166 | 166 | 12 | No | No | No | No | |
| 167 | 167 | 3 | No | No | No | No | |
| 168 | 168 | 3 | No | No | No | No | |
| 169 | 169 | 15 | No | No | No | No | |
| 170 | 170 | 66 | No | No | No | No | |
| 171 | 171 | 10 | No | No | No | No | |
| 172 | 172 | 3 | No | No | No | No | |
| 173 | 173 | 1 | No | No | No | No | |
| 174 | 174 | 1 | No | No | No | No | |
| 175 | 175 | 2 | No | No | No | No | |
| 176 | 176 | 1 | No | No | No | No | |
| 177 | 177 | 8 | No | No | No | No | |
| 178 | 178 | 7 | No | No | No | No | |
| 179 | 179 | 3 | No | No | No | No | |
| 180 | 180 | 22 | No | No | No | No | |
| 181 | 181 | 808 | No | No | No | No | |
| 182 | 182 | 31 | No | No | No | No | |
| 183 | 183 | 12 | No | No | No | No | |
| 184 | 184 | 3 | No | No | No | No | |
| 185 | 185 | 1 | No | No | No | No | |
| 186 | 186 | 1 | No | No | No | No | |
| 187 | 187 | 2 | No | No | No | No | |
| 188 | 188 | 44 | No | No | No | No | |
| 189 | 189 | 1 | No | No | No | No | |
| 190 | 190 | 15 | No | No | No | No | |
| 191 | 191 | 12 | No | No | No | No | |
| 192 | 192 | 3 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 193 | 193 | 2 | No | No | No | No | |
| 194 | 194 | 4 | No | No | No | No | |
| 195 | 195 | 2 | No | No | No | No | |
| 196 | 196 | 7 | No | No | No | No | |
| 198 | 198 | 1 | No | No | No | No | |
| 199 | 199 | 8 | No | No | No | No | |
| 200 | 200 | 15 | No | No | No | No | |
| 201 | 201 | 67 | No | No | No | No | |
| 202 | 202 | 13 | No | No | No | No | |
| 203 | 203 | 1 | No | No | No | No | |
| 204 | 204 | 4 | No | No | No | No | |
| 205 | 205 | 4 | No | No | No | No | |
| 206 | 206 | 11 | No | No | No | No | |
| 207 | 207 | 73 | No | No | No | No | |
| 208 | 208 | 3 | No | No | No | No | |
| 209 | 209 | 4 | No | No | No | No | |
| 210 | 210 | 8 | No | No | No | No | |
| 211 | 211 | 6 | No | No | No | No | |
| 212 | 212 | 8 | No | No | No | No | |
| 213 | 213 | 65 | No | No | No | No | |
| 214 | 214 | 7 | No | No | No | No | |
| 215 | 215 | 9 | No | No | No | No | |
| 216 | 216 | 5 | No | No | No | No | |
| 217 | 217 | 3 | No | No | No | No | |
| 218 | 218 | 6 | No | No | No | No | |
| 219 | 219 | 1,145 | No | **Yes** | No | No | Added to inventory |
| 220 | 220 | 11 | No | No | No | No | |
| 221 | 221 | 22 | No | No | No | No | |
| 222 | 222 | 12 | No | No | No | No | |
| 223 | 223 | 2 | No | No | No | No | |
| 224 | 224 | 126 | No | No | No | No | |
| 225 | 225 | 3 | No | No | No | No | |
| 226 | 226 | 5 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 227 | 227 | 62 | No | No | No | No | |
| 228 | 228 | 17 | No | No | No | No | |
| 229 | 229 | 14 | No | No | No | No | |
| 230 | 230 | 7 | No | No | No | No | |
| 231 | 231 | 26 | No | No | No | No | |
| 232 | 232 | 64 | No | No | No | No | |
| 233 | 233 | 39 | No | No | No | No | |
| 234 | 234 | 2 | No | No | No | No | |
| 235 | 235 | 4 | No | No | No | No | |
| 236 | 236 | 6 | No | No | No | No | |
| 237 | 237 | 2,545 | No | No | No | **Yes** | Contiguous to Mt. Thielsen Wilderness. Added to inventory |
| 238 | 238 | 2 | No | No | No | No | |
| 239 | 239 | 4 | No | No | No | No | |
| 240 | 240 | 183 | No | No | No | No | |
| 241 | 241 | 6 | No | No | No | No | |
| 242 | 242 | 54 | No | No | No | No | |
| 243 | 243 | 14 | No | No | No | No | |
| 244 | 244 | 9 | No | No | No | No | |
| 245 | 245 | 10 | No | No | No | No | |
| 246 | 246 | 7 | No | No | No | No | |
| 247 | 247 | 7 | No | No | No | No | |
| 248 | 248 | 35 | No | No | No | No | |
| 249 | 249 | 2 | No | No | No | No | |
| 250 | 250 | 4 | No | No | No | No | |
| 251 | 251 | 1 | No | No | No | No | |
| 252 | 252 | 36 | No | No | No | No | |
| 253 | 253 | 12 | No | No | No | No | |
| 254 | 254 | 1 | No | No | No | No | |
| 255 | 255 | 4 | No | No | No | No | |
| 256 | 256 | 4 | No | No | No | No | |
| 257 | 257 | 8 | No | No | No | No | |
| 258 | 258 | 118 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 259 | 259 | 9 | No | No | No | No | |
| 260 | 260 | 9 | No | No | No | No | |
| 261 | 261 | 34 | No | No | No | No | |
| 262 | 262 | 3 | No | No | No | No | |
| 264 | 264 | 19 | No | No | No | No | |
| 265 | 265 | 11 | No | No | No | No | |
| 266 | 266 | 1 | No | No | No | No | |
| 267 | 267 | 290 | No | No | No | No | |
| 268 | 268 | 6 | No | No | No | No | |
| 269 | 269 | 4 | No | No | No | No | |
| 270 | 270 | 1,787 | No | No | No | No | |
| 271 | 271 | 112 | No | No | No | No | |
| 272 | 272 | 7 | No | No | No | No | |
| 273 | 273 | 1 | No | No | No | No | |
| 274 | 274 | 8 | No | No | No | No | |
| 275 | 275 | 1 | No | No | No | No | |
| 276 | 276 | 18 | No | No | No | No | |
| 277 | 277 | 19 | No | No | No | No | |
| 278 | 278 | 3 | No | No | No | No | |
| 279 | 279 | 7 | No | No | No | No | |
| 280 | 280 | 11 | No | No | No | No | |
| 281 | 281 | 179 | No | No | No | No | |
| 282 | 282 | 175 | No | No | No | No | |
| 283 | 283 | 1 | No | No | No | No | |
| 284 | 284 | 7 | No | No | No | No | |
| 285 | 285 | 27 | No | No | No | No | |
| 286 | 286 | 37 | No | No | No | No | |
| 287 | 287 | 45 | No | No | No | No | |
| 288 | 288 | 10 | No | No | No | No | |
| 289 | 289 | 1 | No | No | No | No | |
| 290 | 290 | 1 | No | No | No | No | |
| 291 | 291 | 3 | No | No | No | No | |
| 292 | 292 | 4 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 293 | 293 | 9 | No | No | No | No | |
| 294 | 294 | 9 | No | No | No | No | |
| 295 | 295 | 11 | No | No | No | No | |
| 296 | 296 | 1 | No | No | No | No | |
| 297 | 297 | 1 | No | No | No | No | |
| 298 | 298 | 19 | No | No | No | No | |
| 299 | 299 | 7 | No | No | No | No | |
| 300 | 300 | 2 | No | No | No | No | |
| 301 | 301 | 2 | No | No | No | No | |
| 302 | 302 | 44 | No | No | No | No | |
| 303 | 303 | 33 | No | No | No | No | |
| 304 | 304 | 5 | No | No | No | No | |
| 305 | 305 | 14 | No | No | No | No | |
| 306 | 306 | 65 | No | No | No | No | |
| 307 | 307 | 3 | No | No | No | No | |
| 308 | 308 | 19 | No | No | No | No | |
| 309 | 309 | 35 | No | No | No | No | |
| 310 | 310 | 182 | No | No | No | No | |
| 311 | 311 | 13 | No | No | No | No | |
| 312 | 312 | 19 | No | No | No | No | |
| 313 | 313 | 2 | No | No | No | No | |
| 314 | 314 | 35 | No | No | No | No | |
| 315 | 315 | 3 | No | No | No | No | |
| 316 | 316 | 163 | No | No | No | No | |
| 317 | 317 | 16 | No | No | No | No | |
| 318 | 318 | 7 | No | No | No | No | |
| 319 | 319 | 3 | No | No | No | No | |
| 320 | 320 | 11 | No | No | No | No | |
| 321 | 321 | 10 | No | No | No | No | |
| 322 | 322 | 3 | No | No | No | No | |
| 323 | 323 | 42 | No | No | No | No | |
| 324 | 324 | 182 | No | No | No | No | |
| 325 | 325 | 6 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 326 | 326 | 1 | No | No | No | No | |
| 327 | 327 | 40 | No | No | No | No | |
| 328 | 328 | 2 | No | No | No | No | |
| 329 | 329 | 3 | No | No | No | No | |
| 330 | 330 | 1 | No | No | No | No | |
| 331 | 331 | 2 | No | No | No | No | |
| 332 | 332 | 10 | No | No | No | No | |
| 333 | 333 | 9 | No | No | No | No | |
| 334 | 334 | 49 | No | No | No | No | |
| 335 | 335 | 119 | No | No | No | No | |
| 336 | 336 | 28 | No | No | No | No | |
| 337 | 337 | 14 | No | No | No | No | |
| 338 | 338 | 3 | No | No | No | No | |
| 339 | 339 | 3 | No | No | No | No | |
| 340 | 340 | 2 | No | No | No | No | |
| 341 | 341 | 11 | No | No | No | No | |
| 342 | 342 | 45 | No | No | No | No | |
| 343 | 343 | 56 | No | No | No | No | |
| 344 | 344 | 12 | No | No | No | No | |
| 345 | 345 | 3 | No | No | No | No | |
| 346 | 346 | 3 | No | No | No | No | |
| 347 | 347 | 7 | No | No | No | No | |
| 348 | 348 | 7 | No | No | No | No | |
| 349 | 349 | 23 | No | No | No | No | |
| 350 | 350 | 5 | No | No | No | No | |
| 351 | 351 | 107 | No | No | No | No | |
| 352 | 352 | 3 | No | No | No | No | |
| 353 | 353 | 67 | No | No | No | No | |
| 354 | 354 | 34 | No | No | No | No | |
| 355 | 355 | 64 | No | No | No | No | |
| 356 | 356 | 27 | No | No | No | No | |
| 357 | 357 | 13 | No | No | No | No | |
| 358 | 358 | 2 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 359 | 359 | 17 | No | No | No | No | |
| 360 | 360 | 3 | No | No | No | No | |
| 361 | 361 | 3 | No | No | No | No | |
| 362 | 362 | 11 | No | No | No | No | |
| 363 | 363 | 5 | No | No | No | No | |
| 364 | 364 | 1,453 | No | No | No | No | |
| 365 | 365 | 19 | No | No | No | No | |
| 366 | 366 | 4 | No | No | No | No | |
| 367 | 367 | 108 | No | No | No | No | |
| 368 | 368 | 19 | No | No | No | No | |
| 369 | 369 | 12 | No | No | No | No | |
| 370 | 370 | 7 | No | No | No | No | |
| 371 | 371 | 43 | No | No | No | No | |
| 372 | 372 | 1 | No | No | No | No | |
| 373 | 373 | 15 | No | No | No | No | |
| 374 | 374 | 6 | No | No | No | No | |
| 375 | 375 | 1 | No | No | No | No | |
| 376 | 376 | 7 | No | No | No | No | |
| 377 | 377 | 19 | No | No | No | No | |
| 378 | 378 | 2 | No | No | No | No | |
| 379 | 379 | 96 | No | No | No | No | |
| 380 | 380 | 192 | No | No | No | No | |
| 381 | 381 | 45 | No | No | No | No | |
| 382 | 382 | 7 | No | No | No | No | |
| 383 | 383 | 2 | No | No | No | No | |
| 384 | 384 | 9 | No | No | No | No | |
| 385 | 385 | 3 | No | No | No | No | |
| 386 | 386 | 1 | No | No | No | No | |
| 387 | 387 | 373 | No | No | No | No | |
| 388 | 388 | 1 | No | No | No | No | |
| 389 | 389 | 12 | No | No | No | No | |
| 390 | 390 | 3 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 391 | 391 | 12 | No | No | No | No | |
| 392 | 392 | 1 | No | No | No | No | |
| 393 | 393 | 3 | No | No | No | No | |
| 394 | 394 | 95 | No | No | No | No | |
| 395 | 395 | 5 | No | No | No | No | |
| 396 | 396 | 3 | No | No | No | No | |
| 397 | 397 | 4 | No | No | No | No | |
| 398 | 398 | 10 | No | No | No | No | |
| 399 | 399 | 65 | No | No | No | No | |
| 400 | 400 | 1 | No | No | No | No | |
| 401 | 401 | 5 | No | No | No | No | |
| 402 | 402 | 1 | No | No | No | No | |
| 403 | 403 | 62 | No | No | No | No | |
| 404 | 404 | 384 | No | No | No | No | |
| 405 | 405 | 1,636 | No | **Yes** | No | No | Added to Inventory |
| 406 | 406 | 2 | No | No | No | No | |
| 407 | 407 | 1 | No | No | No | No | |
| 408 | 408 | 2 | No | No | No | No | |
| 409 | 409 | 5 | No | No | No | No | |
| 410 | 410 | 14 | No | No | No | No | |
| 411 | 411 | 182 | No | No | No | No | |
| 412 | 412 | 71 | No | No | No | No | |
| 413 | 413 | 110 | No | No | No | No | |
| 414 | 414 | 4 | No | No | No | No | |
| 415 | 415 | 20 | No | No | No | No | |
| 416 | 416 | 48 | No | No | No | No | |
| 417 | 417 | 2 | No | No | No | No | |
| 418 | 418 | 4 | No | No | No | No | |
| 419 | 419 | 58 | No | No | No | No | |
| 420 | 420 | 27 | No | No | No | No | |
| 421 | 421 | 15 | No | No | No | No | |
| 422 | 422 | 166 | No | No | No | No | |
| 423 | 423 | 35 | No | No | No | No | |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | Comments<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 424 | 424 | 9 | No | No | No | No | |
| 425 | 425 | 7 | No | No | No | No | |
| 426 | 426 | 7 | No | No | No | No | |
| 427 | 427 | 14 | No | No | No | No | |
| 428 | 428 | 7 | No | No | No | No | |
| 429 | 429 | 2 | No | No | No | No | |
| 430 | 405 | 42 | No | No | No | No | Created during boundary adjustment of Polygon 405 |
| 431 | 405 | 2 | No | No | No | No | Created during boundary adjustment of Polygon 405 |
| 432 | 405 | 97 | No | No | No | No | Created during boundary adjustment of Polygon 405 |
| 433 | 405 | 58 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps |
| 434 | 405 | 8 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps |
| 435 | 405 | 2 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps |
| 436 | 405 | 5 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps and roads |
| 437 | 405 | 2 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps and roads |
| 438 | 405 | 80 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps and roads |
| 439 | 405 | 7 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps and roads |
| 440 | 405 | 1 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps |
| 441 | 405 | 13 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps |
| 442 | 405 | 15 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps |
| 443 | 405 | 8 | No | No | No | No | Created during boundary adjustment of Polygon 405. Field verification stumps |
| 444 | 237 | 364 | No | No | No | **Yes** | Contiguous to Mt. Thielsen Wilderness. Added to inventory |

| Polygon ID | Parent Polygon ID | Acres | FSH 1909.12 71.1 (1) | FSH 1909.12 71.1 (2a) | FSH 1909.12 71.1 (2b) | FSH 1909.12 71.1 (2c) | **Comments**<br>**Note 1** applies to all 440 polygons except 147, 219, 237, 405 and 444 in this Table. |
|---|---|---|---|---|---|---|---|
| 445 | 237 | 188 | No | No | No | No | Created during boundary adjustment of Polygon 237. Area is surrounded by roads and due to size and shape cannot be effectively managed as a separate unit (Little Deschutes River corridor) |

### Inventory Results

In summary the following areas meet the inventory criteria as potential wilderness areas and are displayed in Map D-5.

**Table 142. Five Potential Wilderness Polygon Identifiers with Acreage and Inventory Criteria**

| Potential Wilderness Identifier | Acreage (rounded) | Inventory Criteria |
|---|---|---|
| 147 | 328 | **2c.** Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size. |
| 219 | 1,145 | **2a.** Area can be preserved due to physical terrain and natural conditions |
| 237 | 2,545 | **2c.** Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size. |
| 405 | 1,636 | **2a.** Area can be preserved due to physical terrain and natural conditions |
| 444 | 364 | **2c.** Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size. |
| **Total** | **6,018** | |