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Environmental Assessment

Long Prairie Mistletoe Reduction

Bend-Ft. Rock Ranger District, Deschutes National Forest
Deschutes, Klamath, and Lake Counties, Oregon

T. 22 S., R.11-13 E. and T. 23 S., R. 11-13 E

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INTRODUCTION

Document Structure

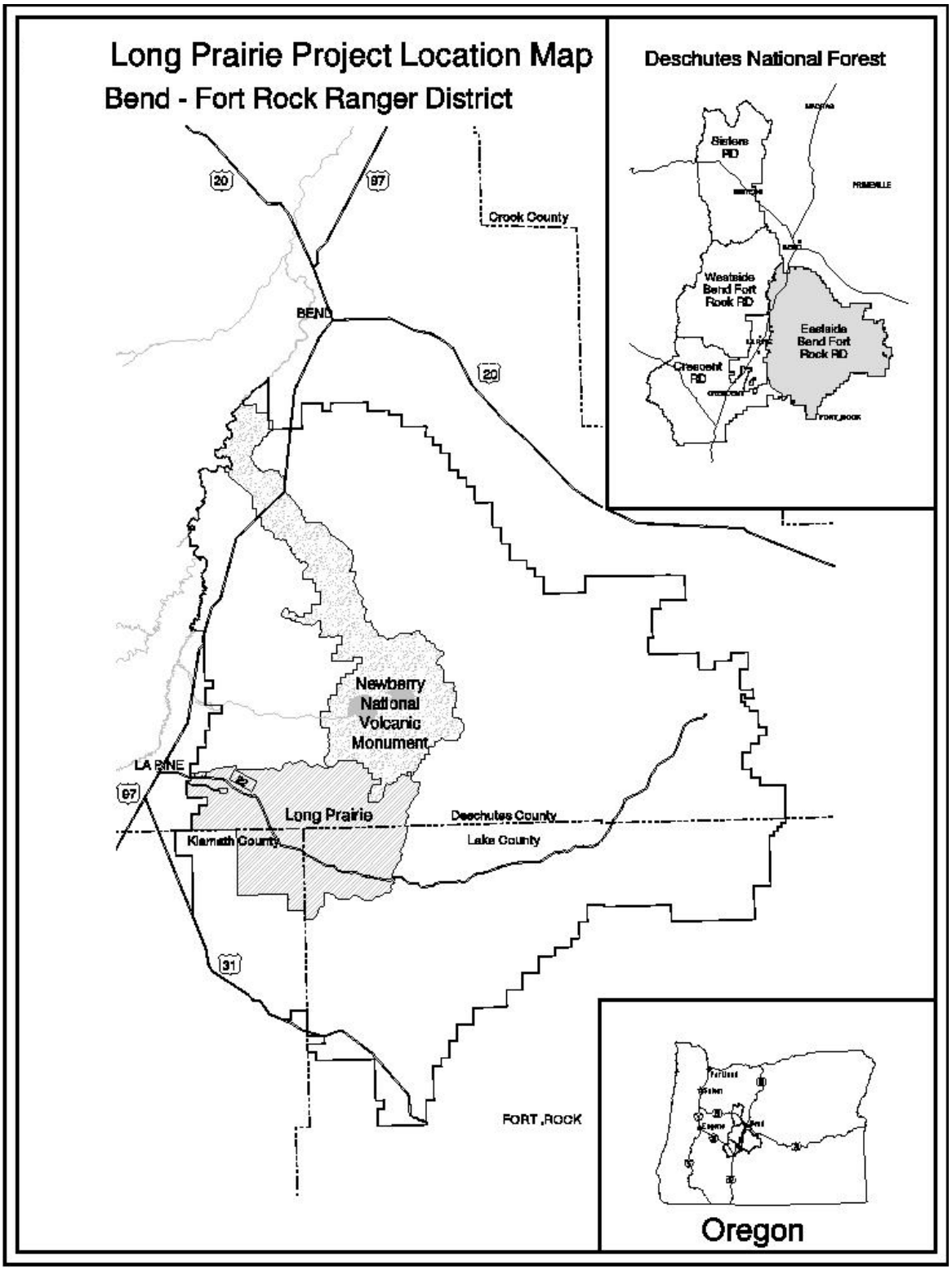
The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result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

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section 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 possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the existing condition is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

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

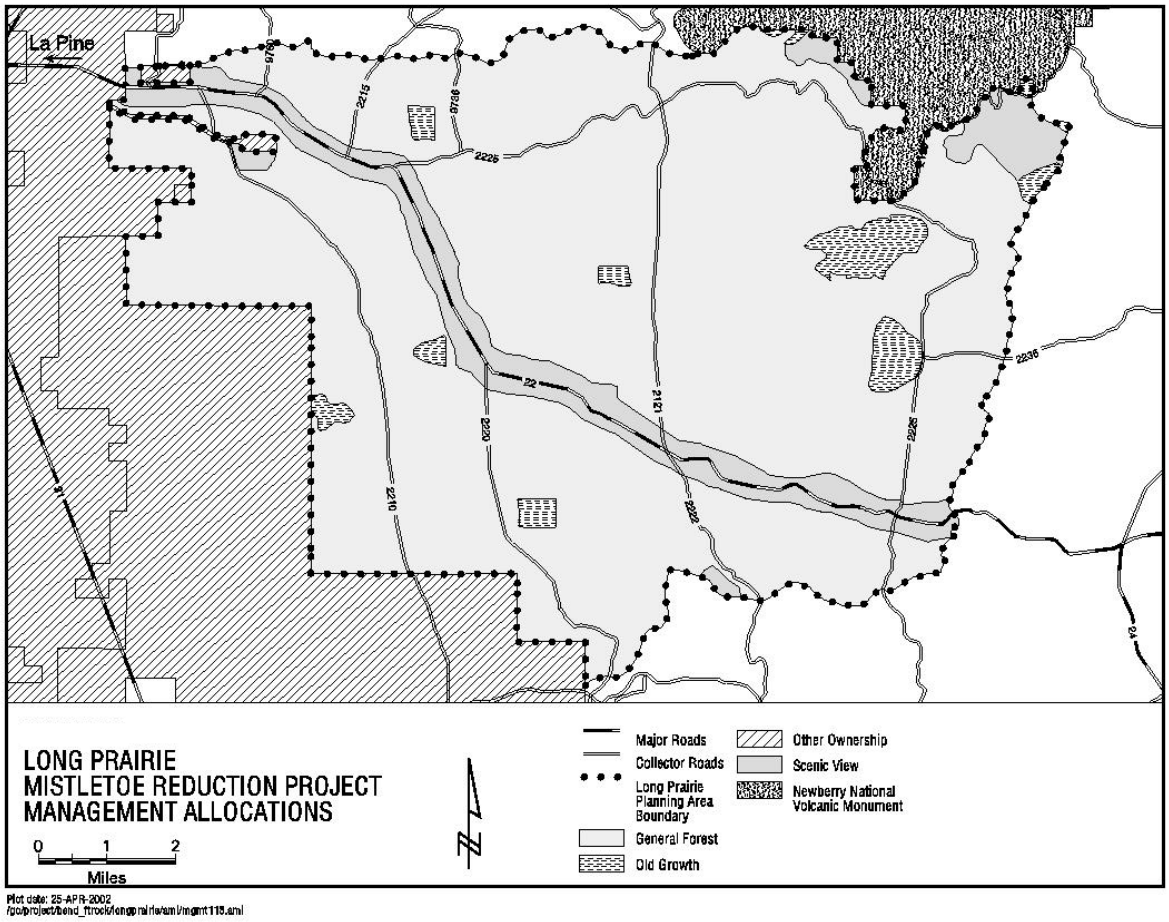
Background

The project area (Map 1) is located approximately 2 miles east of La Pine, Oregon in T. 22 S., R.11-13 E. and T. 23 S., R. 11-13 E. It is approximately 55,867 acres in size. It is bordered to the northeast by Newberry National Volcanic Monument (NNVM). The project area is in the Long Prairie Watershed (5^{th} Field). There is no surface water within the project area. The closest surface water is: 1) Paulina Lake, approximately 2.5 miles northeast of the project area, 2) the Little Deschutes River, approximately 2.5 miles west of the project area, and 3) Paulina Creek, approximately 2.7 miles north of the project area. Elevations range from approximately 4,250 feet just east of La Pine to over 6,600 feet along the boundary of NNVM. The project area is outside the range of the northern spotted owl (Northwest Forest Plan Area).



Map 1. Long Prairie Mistletoe Reduction Project area.

The Deschutes National Forest **Land and Resource Management Plan** (Forest Plan), as amended in June 1995 by the Decision Notice for the Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (Eastside Screens), identifies three management allocations within the project area (Map 2). Approximately 86% of the project area is within general forest, approximately 10% within scenic views (foreground retention along Road 22) and approximately 3% within the old growth allocation.



Map 2. Long Prairie Mistletoe Reduction Project Management Areas.

Desired Condition

The Deschutes Forest Plan identifies management goals for each allocation. The goal within General Forest is to emphasize timber production while providing forage production, visual quality, wildlife habitat and recreational opportunities for public use and enjoyment. In this allocation the forest health goal is to maintain and enhance the vigor of the forest ecosystem through the control of forest pests (including dwarf mistletoe). Within Scenic Views, the management goal is to provide Forest visitors with high quality scenery that represents the natural character of Central Oregon. The forest health goal is to maintain and enhance the vigor of the forest ecosystem through control

or prevention of major insect and disease problems that put the visual resource at an unacceptable degree of risk.

The Forest Plan describes a future condition where the Forest is in an overall state of health, vigor and diversity. As a result, the Forest can fulfill resource management goals both in the short and long term. Undesirable impacts from forest pests on resource objectives are greatly reduced. Where these impacts occur, they are a result of scoping, analysis and a decision framework that considers the desirable and undesirable roles of pests in the context of integrated resource management objectives.

Historic Disturbance Regimes

Historically, fire served to control the occurrence, distribution and severity of dwarf mistletoe in lodgepole and ponderosa pine stands. In premanagement-era lodgepole pine landscapes, Hessburg et al (1994) indicate the amount of mistletoe was highly correlated with boom-and-bust fire cycles characteristic of the series. After fire, mistletoe reinvasion was rapid when islands of live, mistletoe-infected lodgepole pine were scattered throughout the burned area. Reinvasion was slow when fires were large and intense, resulting in near total stand destruction. New infections came from diseased trees on distant perimeters or from chance introductions by birds and small mammals. The Deschutes National Forest Watershed Evaluation & Analysis for Viable Ecosystems (WEAVE) document (USDA 1994a) describes historic fire activity and disease levels in arid (dry) lodgepole pine sites typical of the Long Prairie Project area. Most stand replacing events ranged in size from 50 to 1000 acres. Few trees survived these stand replacing events. Regenerated lodgepole pine in these burn areas would be relatively free of dwarf mistletoe. Mistletoe would slowly spread back into the burn areas from adjacent unburned areas. Birds and other wildlife would also reintroduce mistletoe into the burn areas. Historic fire activity and disease levels in ponderosa pine are described by Hessburg, et.al. (1994). In ponderosa pine stands, fires historically were low intensity underburns. They reduced, but seldom eliminated, mistletoe from a ponderosa pine stand. These fires eliminated mistletoe infected understories. Mistletoe in overstory trees was reduced when witches brooms (profusely branched, dense masses of distorted branches caused by dwarf mistletoe infection) ignited, leading to the destruction of most or all the crown. These frequent, low-intensity fires also slowed mistletoe spread by creating more single story stand conditions and decreasing stand density.

Existing Condition

Since 1970, regeneration harvest treatments have occurred on approximately 35-40% (19,600 to 22,500 acres) of the project area. At least 70% of this harvest occurred in lodgepole pine dominated stands. This treatment also occurred in stands with a mix of lodgepole pine, ponderosa pine, and occasionally white fir. To assure natural regeneration would occur, overstory trees were retained within these stands. Overstory trees were retained at approximately 40 to 60-foot spacing (an average of 12 to 27 trees per acre) to assure distribution of seed across the stand and to provide site amelioration (see Figures 1 and 2). The original intent was to remove seed trees once adequate seedlings were present in the understory. In the years since harvest, these stands have regenerated and an understory of vigorous trees is now present. Understory trees are approaching or exceed a height of 3 feet or an age of 10 years.

Dwarf mistletoe is found throughout the project area. It is also present in varying amounts in overstory trees retained in regeneration harvest units. Dwarf mistletoe is a parasitic plant that affects the health, vigor and growth of both lodgepole and ponderosa pine. It spreads fastest from infected overstory trees to understory trees. Understory trees greater than three feet in height (or more than 10 years old) and generally within 30 feet of an infected overstory tree are at the greatest risk of infection. Dwarf mistletoe reduces diameter and height growth and can kill or predispose the tree to attack by insects or other diseases. The extent to which mistletoe affects the host tree depends largely upon the age when the tree is initially infected. Older, larger trees experience little or no obvious effects whereas younger and smaller trees often experience significant reductions in height and diameter growth. Dwarf mistletoe infection can induce the formation of witches' brooms. These brooms can provide forage, nesting, and cover for birds and mammals, but they can also increase the likelihood of ground fires becoming crown fires. Canopy gaps caused by mistletoe-induced mortality increase within-stand diversity, but also reduce the interior-forest area (Hawksworth and Wiens 1996).

The following pictures demonstrate typical treatment units within the Long Prairie project area. Figure 1 shows a lodgepole pine understory with a mistletoe-infected lodgepole pine overstory. Figure 2 shows a lodgepole pine and ponderosa pine understory with a mistletoe-infected ponderosa pine and lodgepole pine overstory.

Figure 1. Unit #92 in the Long Prairie Mistletoe Project Analysis Area (photo by B. Schroeder, 8/25/04).

Figure 2. Unit #54 in the Long Prairie Mistletoe Project Analysis Area (photo by B. Schroeder, 8/25/04).

Comparison of Desired and Historic Conditions to Existing Condition

Understory trees in natural regeneration units are now at risk of becoming infected with mistletoe given 1) the size and age of understory and 2) the presence of mistletoe in overstory trees and adjacent stands. The distribution of infected overstory trees in these units assures most understory trees have the potential to become infected with mistletoe. Mistletoe infection can reduce the future growth potential of understory trees. Consequently, the likelihood of developing larger diameter trees desired for timber production and favored by or depended upon by many wildlife species can be reduced. Also, the potential to develop healthy, full crowned trees that are desirable for scenic views can be reduced. Retention of overstory trees in natural regeneration units would maintain multi-storied stand structures that were likely uncommon with historic fire disturbances. Spread and intensification rates of mistletoe into the understory are likely to occur faster and more extensively than what occurred historically.

Management Direction

Where diseases are such that unacceptable damage or reduction in tree growth can be predicted, protection measures may be warranted prior to the actual damage occurring (Forest Plan Standard and Guideline (S&G) TM-10). The Forest Plan does not specify what growth losses are acceptable as a result of dwarf mistletoe infection in even-aged

stands. The Forest Plan does address what's an acceptable loss in uneven-aged stands. S&G TM-32 states in part that uneven-aged management should be restricted to stands where dwarf mistletoe can be stabilized indefinitely at a low infection level to insure no more than a 10% loss in productivity occurs.

Depending on stand conditions, the Forest Plan outlines the following as possible management strategies for dwarf mistletoe infected stands (Forest Plan Table 4-29):

1. Eliminate inoculum by regeneration harvest.
2. Convert to single story structure, leaving only lightly infected trees. Regenerate at the end of the rotation.
3. Favor non-host species in silviculture operations.
4. Remove overstory before regeneration a 3 feet tall or 10 years old.
5. Remove overstory and thin understory to maintain infections at low levels.

Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (Regional Forester's Forest Plan Amendment #2) provides direction for maintaining snags and green trees replacements. According to Interim Management Direction, all sale activities will maintain snags and green tree replacement trees of greater than or equal to 21 inches dbh, (or whatever is the representative dbh of the overstory layer if it is less than 21 inches dbh), at 100% potential population levels of primary cavity excavators. This should be determined using the best available science on species requirements as applied through current snag models or other documented procedures.

The Wildlife Tree and Log Implementation Strategy (USDA 1994b) provides guidance and options for meeting snag, green tree replacement (GTR) and down log objectives (Forest Plan S&G WL-38) across the Forest. According to the strategy, desired pattern for wildlife trees and logs is a combination of patches or clumps and randomly scattered individual trees and logs. Patches should generally be larger than 2.5 acres. Wildlife trees and logs should be provided within treatment units. The strategy recognizes there are circumstances that may preclude meeting wildlife tree and log objectives within the unit. In these situations, it is acceptable to provide the wildlife trees and logs in patches or clumps adjacent to or on the perimeter of the treatment units. Patches or clumps outside the units should be properly designated and tracked.

The Wildlife Tree and Log Implementation Strategy describes the effects dwarf mistletoe has on host trees and the overall landscape. It also discusses the role mistletoe plays in providing habitat for wildlife. Keeping in mind these processes, the strategy suggests avoiding conditions conducive to the spread and intensification of mistletoe unlikely to occur with historic disturbance regimes. The strategy indicates the most desirable treatment is to remove all mistletoe infected trees which are of the same species as the regenerated stand. If the overall analysis area is snag deficient, then complete treatment may not be possible and other techniques could be used to retain snags and limit the spread of mistletoe.

The Forest Plan 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 (Forest Plan page 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. S&G 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. S&G SL-5 limits the use of mechanical equipment in sensitive soil areas. Operations will be restricted to existing logging facilities (i.e., skid trails, landings) and roads, whenever feasible.

Forest Plan Management Areas MA-8, MA-9, and MA-15 do not contain specific standards and guidelines for the soil resource in this area. The Forest-wide standards and guidelines apply to this project proposal.

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 Forest Plan standards and guidelines, which are designed to protect or maintain soil productivity. Detrimental soil impacts are those that meet the criteria described in the Soil Quality Standards listed below.

Detrimental Compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent, or more, over the undisturbed level.

Detrimental Puddling occurs when the depth of ruts or imprints is six inches or more.

Detrimental Displacement is the removal of more than 50 percent of the A horizon from an area greater than 100 square feet, which is at least 5 feet in width.

Severely Burned soils are considered to be detrimentally disturbed when the mineral soil surface has been significantly changed in color, oxidized to a reddish color, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer.

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. The following excerpt is taken from FSM 2520.3:

"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 impacts 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".

This Regional policy is consistent with the LRMP interpretation of Forest-wide standards and guidelines SL-3 and SL-4, which is filed in the Deschutes National Forest Supervisor's Office (Final Interpretations, Document 96-01, Soil Productivity, 1996).

Purpose and Need for Action

The purpose and need for action includes:

1) Reduce the spread of dwarf mistletoe from overstory trees to understory trees within areas previously harvested and regenerated to increase the likelihood of: a) developing larger diameter trees desired for timber production and favored by or depended upon by many wildlife species, and b) having healthy, full crowned trees desirable for scenic views.
2) Provide commercial forest products to the economy in support of the Forest Service's legally mandated mission.

This action responds to the goals and objectives of the Deschutes National Forest Land and Resource Management Plan (1990, as amended). The purpose of this project is to reduce the likelihood of dwarf mistletoe spreading from infected overstories to understories in natural regeneration units in the project area, and to provide timber products to benefit local and regional communities.

Proposed Action

The action proposed by the Forest Service to meet the purpose and need is felling and removal of live overstory trees excess to cavity nester habitat needs that are greater than or equal to 4 inches dbh and less than 21 inches dbh. Trees proposed for removal include those with and without dwarf mistletoe. Within proposed treatment units, approximately 3 trees per acre would be retained to provide future snags (green tree replacements) for cavity nester habitat. Additional green tree replacements would be provided adjacent to proposed treatment units.

Decision Framework

Based upon the effects of the alternatives, the Forest Supervisor will decide where and under which circumstances dwarf mistletoe reduction or elimination will occur. The Forest Supervisor will determine how much commercial wood fiber will be offered for

sale. In addition, the Forest Supervisor will determine which safeguards and mitigation measures are needed for resource protection.

Public Involvement

The initial proposal was provided to the public and other agencies for comment during scoping in a letter dated April 30, 2002, with comments requested by May 31, 2002. Two letters were received in response to scoping. The proposal has been listed in the Schedule of Projects beginning in the summer of 2002. Information on the proposed action and on an alternative to the proposed action went out for public comment between May 19 and June 30, 2004; four groups responded with comments. Representatives from the Oregon Dept. of Fish and Wildlife and the U.S. Fish and Wildlife Service reviewed the project in the field with Forest Service personnel on 08/26/2004.

Comments received from the public included support for the Purpose and Need for action. Conversely, concern was expressed that mistletoe is a part of forest function and is important to many species of birds and wildlife. There was also concern for the amount of temporary road construction. The strategies for providing green tree replacements were questioned. Concern was expressed that green tree replacements retained outside of units may be lost in future sales. There was also concern that insufficient numbers of green tree replacements were to be retained within treatment units. One respondent identified an unroaded area within the project area and described its ecological value. Concern was expressed for how the actions would affect the unroaded characteristics.

Issues

Considering public and internal comments, the interdisciplinary team developed a list of issues to address. The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

The Forest Service identified the following significant issues:

1. The proposed action would remove overstory trees with and without dwarf mistletoe. Majority of green tree replacements would be in clumps outside of harvest units. To reduce spread of dwarf mistletoe, it is not necessary to remove mistletoe-free trees. More green tree replacements could be retained within treatment units if mistletoe-free trees are retained. Future recruitment of snag and coarse woody material could be higher within treatment units.
   Issue Measures

- Acres of treatment that would remove trees with and without dwarf mistletoe.
- Acres of treatment that would retain trees without dwarf mistletoe.
- Average number of green tree replacements retained within treatment units.
- Proportion of treatment areas with relatively low or high levels of green tree replacements.

2. The proposed use of ground-based harvest equipment can potentially impact soil productivity through physical disturbances that displace soil surface layers or reduce soil porosity (compaction). The proposed removal of trees from activity areas can potentially cause adverse changes in organic matter levels.
   Issue Measures
   - Change in extent of detrimental soil conditions following proposed harvest and mitigation treatments within individual activity areas.
   - Amount of coarse woody debris (CWD) and surface organic matter that would be retained to provide ground cover protection and a long-term source of nutrients on treated sites.
   - 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.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This section describes and compares the alternatives considered for the Long Prairie Mistletoe Reduction project. It includes a description each alternative considered. Maps for each action alternative are included as Appendices. This section 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. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., remove overstory trees with and without mistletoe versus remove only overstory infected with mistletoe) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e., detrimental soil disturbance or the cost of harvesting overstory versus the cost of girdling/pruning).

Alternatives

Alternative 1 – No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No treatments would be done to reduce the spread of mistletoe from overstory trees to understory trees in stands regenerated following timber harvest.

Alternative 2 – The Proposed Action

In a request for comments dated April 30, 2002, the Forest Service described a proposed action to reduce dwarf mistletoe in stands naturally regenerated following timber harvest. Approximately 12,080 acres were proposed for treatment. Subsequent field review found areas where treatment was not necessary to meet the purpose and need for action. In some cases, there was insufficient volume to implement the proposed commercial harvest. The proposed action was revised to incorporate this new information. Approximately 3,900 acres were dropped from the original proposed action.

With Alternative 2, the Forest Service proposes to treat approximately 8,180 acres of stands naturally regenerated following timber harvest (see Maps 3-6 and Appendix 1). The majority of proposed treatment is within the General Forest allocation (Table 1). Treatment would consist of felling and removing live overstory trees excess to cavity nester habitat greater than or equal to 4 inches diameter at 4.5 feet above ground level (dbh) and less than 21 inches dbh. Trees proposed for removal include those with and without dwarf mistletoe. Within proposed treatment units, approximately 3 trees per acre would be retained to provide future snags (green tree replacements) for cavity nester habitat. Green tree replacements would be greater than 8 inches dbh or the largest trees available. Existing snags and coarse woody material would be retained.

Proposed treatment is projected to provide approximately 11,400 hundred cubic feet (CCF) or 5.9 million board feet (MMBF) of wood fiber volume (±20%). Much of this volume would come from lodgepole pine averaging 8 to 10 inches dbh. A minor amount of the volume would come from ponderosa pine.

Alternative 3

Alternative 3 proposes the most treatment to reduce dwarf mistletoe in stands naturally regenerated following timber harvest. Approximately 11,455 acres are proposed for treatment (see Maps 7-10 and Appendix 1). The majority of proposed treatment is within the General Forest Allocation (Table 1). All treatments would retain existing snags and coarse woody material.

On approximately 5,304 acres, Alternative 3 proposes to reduce dwarf mistletoe using the same method described for Alternative 2. Treatment would consist of felling and removing live overstory trees excess to cavity nester habitat greater than or equal to 4 inches dbh and less than 21 inches dbh. Trees proposed for removal include those with and without dwarf mistletoe. Within proposed treatment units, approximately 3 trees per acre would be retained to provide future snags (green tree replacements) for cavity nester habitat. Green tree replacements would be greater than 8 inches dbh or the largest trees available.

On approximately 5,374 acres, Alternative 3 proposes a variety of treatments to reduce mistletoe infected overstory trees while retaining overstory trees without dwarf mistletoe to serve as green tree replacements. Overstory trees not infected with dwarf mistletoe

would be retained as individual trees or as clumps within the treatment area. Proposed treatments include:

1) Fall and remove mistletoe-infected overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh on approximately 581 acres.
2) Within approximately 1,203 acres, designate for retention clumps of overstory trees free of dwarf mistletoe. It's estimated 50% of these acres would be in retention clumps. Outside of retention clumps, fall and remove live trees greater than or equal to 4 inches dbh and less than 21 inches dbh with and without dwarf mistletoe.
3) On approximately 3,590 acres, mistletoe infected lodgepole or ponderosa pine would be pruned, girdled, or felled and retained on site. Method used would depend on tree diameter and extent of mistletoe infection. Trees to be treated would generally be greater than 4 inches dbh.

   With the **pruning treatment**, branches would be severed from the bole of the tree. All branches below the source of mistletoe infection, all mistletoe infected branches, and four branch whorls above the last visible source of mistletoe infection would be pruned. The intent of the treatment would generally be to remove mistletoe infected branches without killing the tree. There would be no upper diameter limit on the size of tree that would be pruned. The **girdling treatment** would remove a band of bark and cambium approximately 6 inches wide from around the entire circumference of the tree. The intent of the treatment would be to kill the tree, thereby killing the mistletoe. Trees would be girdled at approximately 4 feet above the ground. There would be no upper diameter limit on the size of tree that would be girdled. The **felling treatment** would consist of cutting mistletoe infected trees at approximately ground level. Felled trees would be retained on site. To minimize reduction of future cavity nesting habitat, felling would be limited to trees less than 8 inches dbh. Where trees are felled within 200 feet of a two or four digit Forest Service Road, branches from felled trees would be severed from the bole, piled, and burned.

   Lodgepole and ponderosa pine less than 8 inches dbh would generally be felled. If mistletoe infection is confined to the lower portion of the crown, trees could instead be pruned. Pruning would be possible if it could be done safely from the ground using a chain saw. Maximum safe pruning height using chainsaws is approximately 6 feet from the ground.

   Lodgepole pine greater than or equal to 8 inches dbh would generally be girdled. If mistletoe infection is confined to the lower portion of the crown, trees could instead be pruned. Pruning would generally be possible if it could be done safely from ground using a pruning saw. The maximum pruning height using these saws is approximately 16 feet from the ground. Ponderosa pine greater than or equal to 8 inches dbh would generally be climbed and pruned. If pruning would result in the tree having less than 25 percent live crown ratio, trees would instead be girdled.

   As funding allows, proposed girdling, pruning and felling of mistletoe infected overstory trees would occur within 5 to 7 years of the decision.

The following treatments are also unique to Alternative 3. On approximately 648 acres, Alternative 3 proposes to retain no lodgepole pine overstory greater than or equal to 4 inches and less than 21 inches dbh. Ponderosa pine and white fir within the units would provide green tree replacements. Similarly, on approximately 24 acres, no ponderosa pine greater than or equal to 4 inches and less than 21 inches dbh would be retained. Lodgepole pine within proposed treatments would provide green tree replacements. On approximately 105 acres, all lodgepole pine overstory greater than or equal to 4 inches and less than 21 inches dbh would be removed. With this treatment, all green tree replacements would be provided outside of treatment area. These treatments would remove overstory trees with and without dwarf mistletoe.

Proposed treatment is projected to provide approximately (±20%) 11,000 hundred cubic feet (CCF) or 5.7 million board feet (MMBF) of wood fiber volume. Much of this volume would come from lodgepole pine trees averaging 8 to 10 inches in diameter at 4.5 feet above the ground. A minor amount of the volume would come from ponderosa pine.

Actions Common to Alternatives 2 and 3

Felling and removal of trees would be done using ground-based equipment. Trees would generally be felled using a ground-based machine equipped with a felling head. The machine would be track-mounted or rubber-tired. The felling head would be boom-mounted or fixed. Felled trees would be whole-tree yarded to landings using track-mounted or rubber tire skidders. To minimize increasing detrimental soil disturbance, skid trails and landings used for the prior harvest would be used where possible. In some cases, this would mean using skid trails and landings that have been subsoiled. Slash generated at the landings would be machine piled and burned.

To access some units, currently roads would need to be opened (see Maps 3-10). For both action alternatives, approximately 1.5 to 2 miles of currently closed roads would need to be opened. Following harvest, closures would be re-established. Temporary roads would be needed to access some units (see Maps 3-10). All temporary roads would be located on pre-existing, unclassified road prisms. For Alternative 2, approximately 43 miles of temporary roads would be needed. For Alternative 3, approximately 33 miles would be needed. Temporary roads used for this entry would be closed following harvest. No new road construction is proposed.

In addition to the green tree replacements retained within the treatment units, green tree replacements would be provided in patches or clumps outside and adjacent to proposed treatment units. Green tree replacement clumps outside of the treatment units would be designated and tracked within one of the district's GIS data layers. With **Alternative 2**, approximately 5,140 acres of green tree replacement clumps would be designated and tracked (Appendix 2). With **Alternative 3**, approximately 6,580 acres would be designated and tracked (Appendix 3). Clumps range in size from 2 to 230 acres in size and average approximately 30 acres. Areas designated as green tree replacement clumps would not necessarily be precluded from future harvest. Future treatments would need to retain at least 53 trees per acre greater than or equal to 8 inches dbh. Green tree replacement designation would remain in these areas until understory trees within

regeneration units are large enough (10" dbh for lodgepole pine and 15" dbh for ponderosa pine) to provide suitable snag habitat. This could take up to 60 to 80 years.

The following actions would occur within 5 years of the decision: 1) removal of overstory trees, 2) the piling and burning of activity created slash, and 3) the opening and reclosing of roads. Within 7 to 9 years of the decision, landings and skid trails would be subsoiled as needed to mitigate soil compaction in excess of LRMP Standards and Guidelines. Within 8 to 10 years of the decision, subsoiled landings, skid trails, and temporary roads would be monitored for noxious weeds.

Mitigations Common to Alternatives 2 and 3

Mitigation measures are specific actions that could be taken to minimize, avoid or eliminate potentially significant impacts on the resources that would be affected by the alternatives, or rectifying the impact by restoring the affected environment (40 CFR 1508.02). The following design features and mitigation measures were developed to ease some of the potential impacts the various alternatives may cause.They would be applied to both action alternatives. These mitigation measures and design elements are considered in the effects analysis.

The effectiveness of each measure is rated at high, moderate, or low to provide a qualitative assessment of expected effectiveness that the implemented practice will have on preventing or reducing impacts on resources. Effectiveness ratings 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), and
d) Fact (obvious by reasoned, logical response).

HIGH: Practice is highly effective (greater than 90 %), 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.

Soils

1. Minimize the extent of new soil disturbance from mechanical treatments by implementing some or all of the following design features:

a) Use existing log landings and skid trail networks (whenever possible). Subsoiling treatments have rehabilitated disturbed soil on roads and logging facilities in

portions of some activity areas and vegetative cover currently exists to minimize surface erosion. Avoid re-use of previously subsoiled areas, as much as possible, to protect established vegetative cover and minimize surface erosion.

b) Designated locations for new trails and landings need to best fit the terrain and minimize the extent of soil disturbance.
c) Maintain spacings of 100 to 150 feet for all primary (main) skid trail routes, except where converging at landings. Closer spacings due to complex terrain must be approved in advance by the Timber Sale Administrator. Main skid trails have typically been spaced 100 feet apart (11 % of the unit area) from 1994 to present. For the larger activity areas (greater than 40 acres) that can accommodate wider spacing distances, it is recommended that distance between main skid trials be increased to 150 feet to reduce the amount of detrimentally disturbed soil to 7 percent of the unit area (Froehlich, 1981, Garland, 1983). This would reduce the amount of surface area where restoration treatments, such as subsoiling, would be required to mitigate impacts to achieve soil management objectives.
d) Restrict skidders and tractors to designated areas (i.e., roads, landings, designated skid trails), and limiting the amount of traffic from other specialized equipment off designated areas. The use of specialized machinery will be authorized to make no more than two equipment passes on any site-specific area to accumulate materials.
e) Use of directional felling techniques from pre-approved skid trails, and suspending the leading end of logs during skidding operations.
f) Avoid equipment operations during times of the year when soils are extremely dry and subject to excessive soil displacement.
g) Avoid equipment operations during periods of high soil moisture, as evidenced by equipment tracks that sink deeper than during dry or frozen conditions.
h) 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).

(**Effectiveness: High**)

2. Restrict mechanical disturbance on slopes greater than 30 percent to designated areas (i.e., roads, landings, designated skid trails) at all times and require operators to winch logs to skidders. Hand felled trees shall be directionally felled toward pre-approved skid trails. Exceptions for areas that make up less than 10 percent of an activity area would be subject to Forest Service approval. Assure that water control structures are installed and maintained on skid trails that have gradients of 10 percent or more.

Portions of the following five units proposed for mechanical treatment contain slopes greater than 30 percent:

Alternative 2: Unit 296
Alternatives 2 and 3: Units 25, 83, 84, and 97

(**Effectiveness: High**)

3. Assure that water control structures are installed and maintained on skid trails that have gradients of 10 percent or more. Ensure erosion control structures are stabilized and working effectively. (**Effectiveness: High**)

4. 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. (**Effectiveness: Moderate**)

5. Minimize the erosive effects of concentrated water through the proper design and construction of temporary roads. (**Effectiveness: Moderate**)

6. Reclaim temporary roads, log landings and primary (main) skid trails within some of the proposed activity areas to reduce the cumulative amount of detrimentally compacted soil and meet Regional guidance provided in FSM 2520, R-6 Supplement No. 2500-98-1. Appropriate rehabilitation treatments include the use of subsoiling equipment to loosen compacted soil layers, redistributing humus-enriched topsoil in areas of soil displacement damage, and pulling available slash and woody materials over the treated surface to establish effective ground cover protection. Reclaim portions of the following 190 activity areas, ranging in size from 3 to 242 acres, which are expected to exceed allowable limits of detrimental soil conditions following the mechanical treatments proposed with this project. Decommission (obliterate) logging facilities that will not be needed for future management. Estimated subsoil acres needed to comply with management direction are included in a unit-specific table in Appendix 2. (**Effectiveness: High**)

Units: 5, 6, 7, 10, 11, 12, 13, 14, 16, 17, 18, 19, 21, 24, 25, 26, 37, 38, 39, 41, 43, 45, 46, 47, 48, 49, 51, 52, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 65, 66, 67, 71, 72, 75, 78, 79, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 101, 102, 103, 105, 107, 108, 109, 111, 113, 114, 116, 118, 119, 120, 121, 122, 123, 126, 128, 130, 131, 133 135, 136, 137, 138, 139, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 154, 155, 156, 160, 161, 162, 163, 164, 165, 166, 168, 170, 173, 174, 175, 176, 177, 178, 179, 180, 182, 185, 188, 189, 190, 191, 194, 195, 196, 200, 201, 203, 204, 205, 206, 209, 210, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 226, 227, 228, 229, 230, 232, 234, 237, 242, 243, 245, 247, 248, 249, 254, 255, 256, 257, 258, 259, 260, 262, 264, 265, 266, 270, 274, 275, 276, 277, 278, 279, 280, 282, 283, 284, 286, 288, 294, 296, and 298.
(Note: Listed units are for both action alternatives. Some units may not apply to each alternative.)

Noxious Weeds

7. Water for dust abatement will be obtained where access to water is weed-free. (**Effectiveness: High**)

Wildlife

8. Retain all existing snags as supplemental wildlife trees for roosting and foraging except when they pose a hazard, other resource protection, or project logistics (Wildlife and Log Implementation Strategy, LRMP Standard WL-38). (**Effectiveness: Moderate)**

9. Cooper's hawk nests identified in the Wildlife Specialist's Report will be protected from disturbing activities within ¼ mile by restricting operations during the nesting period, April 15 – August 31 (WL-19). (**Effectiveness: High**)

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

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

(**Effectiveness: High**)

11. Protect the area within ¼ mile of the old goshawk nest site (as identified in the Wildlife Specialist's Report) from disturbing activities during the nesting season (March 1 – August 31, WL 3). (**Effectiveness: High**)

12. Trees will not be harvested in a 150-200 foot radius around cave entrances and infeeder drainages with slopes less than 30 degrees. There will be no ground disturbing activities on slopes steeper than 30 percent adjacent to cave entrances. Similar buffers will be maintained around direct drainages into caves. This includes sinkholes, cave collapse areas known to open into a cave's drainage system, and perennial, intermittent or ephemeral streams flowing into caves (CV-3). (**Effectiveness: High**)

Scenic Views

13. Within the Foreground landscape as seen from the Road 22 scenic corridor, protect all residual vegetation where possible. Severely damaged trees, those that may not survive after two growing seasons, must be treated and/or removed as part of post-treatment activities. (**Effectiveness: High**)

14. Flush cut stumps in treatment units within immediate foreground (0-300 feet) of the Road 22 scenic corridor to reduce treatment visibility. (**Effectiveness: High**)

15. Where possible, design and locate parallel skid trails and landing areas at least 300 feet from the Road 22 scenic corridor to reduce visibility to casual forest visitors. (**Effectiveness: High**)

16. Minimize ground disturbance within the Foreground sensitive viewing areas to reduce soil contrast that may adversely affect scenic quality. (**Effectiveness: High**)

17. Slash treatment shall be completed within two years of treatment along the Road 22 scenic corridor. (**Effectiveness: High**)

Heritage Resources

18. All cultural or heritage resources that are or have potential for eligibility on the historic register would be avoided. Any discoveries of cultural or heritage resources made during project operations would be protected by avoidance and evaluated by heritage resource personnel. **(Effectiveness: High)**

Public Health and Safety

19. Within harvest units, retain green tree replacements at least 100 feet from open roads. Goal is to reduce future safety hazard when trees die. **(Effectiveness: High)**

Mitigation Specific to Alternative 3

Public Health and Safety

1. To reduce risk of girdled trees falling on roadways, use treatments other than girdling within 100 feet of open roads. **(Effectiveness: High)**

KV Projects Common to Alternatives 2 and 3

The following activities, listed in order of priority, would be taken following proposed timber harvest. These activities are appropriate for K-V funding.

1. **Stocking Survey.** (Alternatives 2 and 3) Following removal of overstory trees, stands would be surveyed to monitor understory stocking.
2. **Whipfelling**. (Alternative 3) Following treatment of overstory trees, undesirable whips in the understory would be felled in the following units: 16, 65, 89, 229, and 288.
3. **Subsoil – Mitigation**. (Alternatives 2 and 3) Subsoiling treatments would be accomplished as described in the site-specific mitigation measure common to the action alternatives. Individual activity areas that would receive soil restoration treatments are identified by unit number in the mitigation measure (Appendix 3). Estimated subsoil acres needed to comply with management direction are included in a unit-specific table in Appendix 2. If the Responsible Official selects an action alternative, subsoiling treatments would be implemented following project activities to meet the stated objectives for maintaining soil productivity.
4. **Noxious Weed – Monitoring.** (Alternatives 2 and 3) Monitor subsoiled skid trails and landings for the presence of noxious weeds. If weeds are found, they would be pulled if the infestation is manageable. Weeds pulled during or after the flowering/fruiting period would be bagged and removed for off-site disposal. Monitoring would continue for 2 years following subsoiling.

5. **Damaged Tree Felling - Mitigation.** (Alternative 2 and 3) Within the scenic view foreground allocation, understory trees damaged during proposed removal of overstory trees would be felled as needed to meet visual quality objectives. Felled trees would be lopped and scattered or handpiled and burned.
6. **Subsoil – Restoration/Enhancement.** (Alternatives 2 and 3) Additional subsoiling treatments on skid trails and log landings would further reduce the cumulative amount of detrimentally compacted soil within activity areas. This would result in a net improvement in soil quality over a larger portion of the project area. These activities would likely be funded with KV monies or other sources, as available, but this is not a mandatory part of the proposed actions.

Monitoring

Project monitoring would focus primarily on "implementation monitoring" to assure the selected alternative and mitigation measures are implemented on the ground as designed.

Scenic Views Monitoring

Objective: Maintenance of desired views along Road 22.

Monitoring Elements: Landing location and and skid trail orientation. Understory trees.

Area of Consideration: Units adjoining Road 22.

Suggested Methodolgy: Ocularly survey at start of harvest activities to assure landings and skid trails are located in visually desirable locations. Ocularly survey following harvest activities to access extent of damage to understory and initiate treatments to fall damaged trees detracting from visual quality objectives.

Alternatives Considered but Eliminated from Further Analysis

1. Restoration treatment that does not utilize commercial logging.
   While this alternative would meet part 1 of the stated purpose and need, it would not meet part 2, "Provide commercial forest products to the economy in support of the Forest Service's legally mandated mission."

2. Controlled reintroduction of fire to return dwarf mistletoe to HRV levels.
   This alternative would not be feasible in lodgepole pine stands. It also would not be feasible in the majority of ponderosa pine stands. Understory stocking is generally high. Many ponderosa pine stands contain a mixture of ponderosa and lodgepole pine (Table 2). Overstory ponderosa pine are generally too few in number to utilize site growth potential, an objective in the General Forest management allocation. Greatest utilization of growth potential would be realized by managing both ponderosa and lodgepole pine understory trees. Additionally, this alternative would not meet part 2 of the stated purpose and need, "Provide

commercial forest products to the economy in support of the Forest Service's legally mandated mission."

3. Understory thinning.
   This alternative would not meet either part 1 or part 2 of the stated purpose and need. Part 1, "Reduce the spread of dwarf mistletoe from overstory trees to understory trees within areas previously harvested and regenerated to increase the likelihood of: a) developing larger diameter trees desired for timber production and favored by or depended upon by many wildlife species, and b) having healthy, full crowned trees desirable for scenic views," would not be met because the infected overstory would not be removed, so the risk of spreading mistletoe from the overstory to the understory would remain. Part 2, "Provide commercial forest products to the economy in support of the Forest Service's legally mandated mission," would not be met because a precommercial thin of the understory would not provide timber products to the economy.

4. Don't reuse existing skid trails and landings.
   This alternative was eliminated from further analysis because it would not be desirable to impact additional ground within the units. Restricting vehicle and machinery access to existing skid trails and landings would minimize additional soil and vegetation impacts within the units.

5. Remove overstory greater than 21" dbh.
   For the ponderosa pine plant association group, the amount of late or old structural stage is currently below the Historic Range of Variability. According to Interim Management Direction, all remnant late and old seral and/or structural live trees greater than or equal to 21" dbh that currently exist within the stands proposed for harvest activities are to be maintained. The Regional Forester recently (June 11, 2003) issued guidance for implementing Eastside Screens (Interim Management Direction). While the direction indicates some flexibility in implementing 21" diameter limitations is appropriate, it confirms the objective of increasing the number of large trees and LOS stands on the landscape. Within units proposed for treatment, there are relatively few trees greater than 21" dbh infected with dwarf mistletoe. It is not necessary to remove these trees to adequately meet the purpose and need for reducing mistletoe spread to understory trees.

Comparison of Alternatives

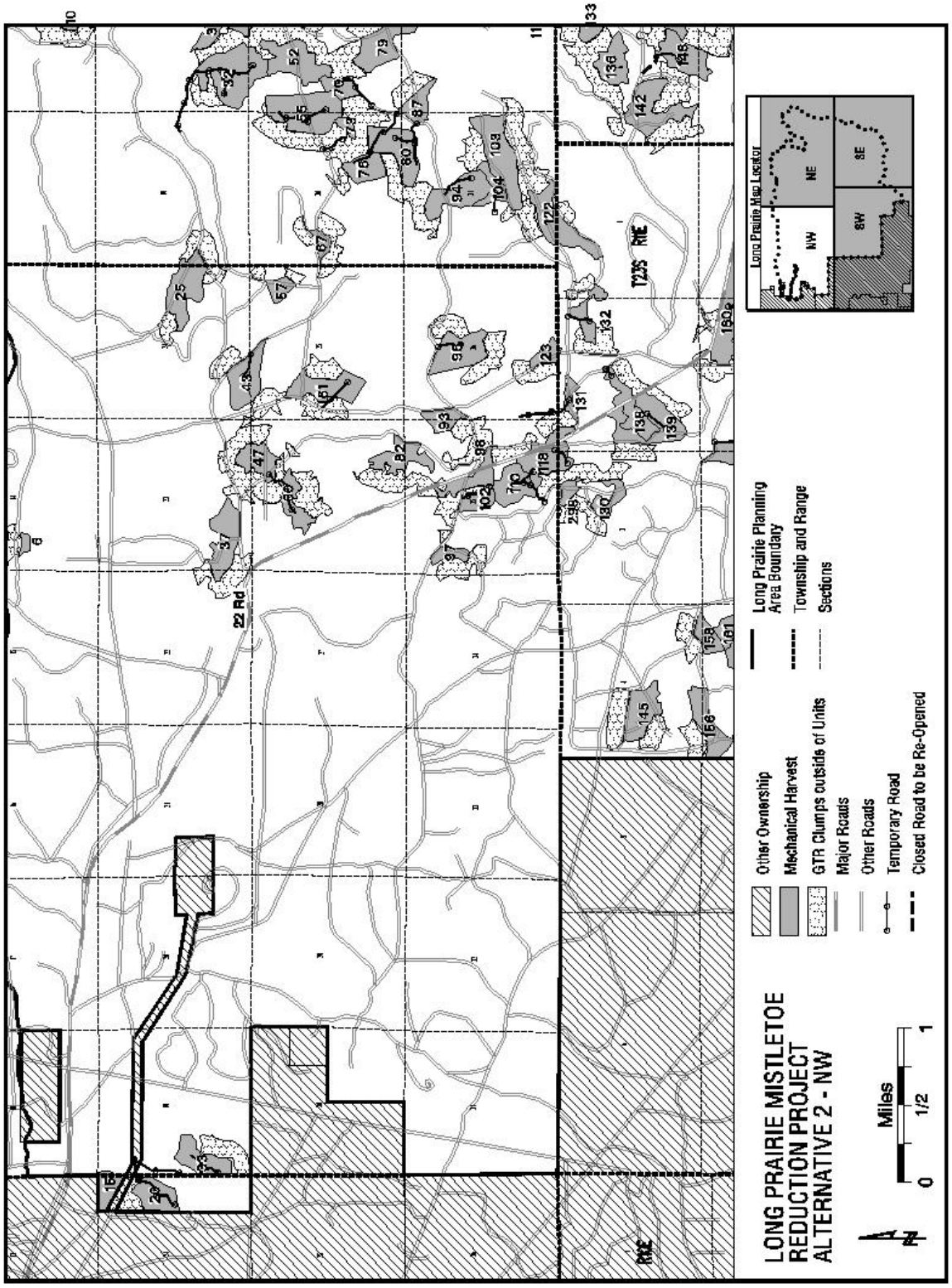
This section summarizes the effects of implementing each alternative. Information in Table 1 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. Information in Table 2 is focused on how overstory treatment and green tree replacement strategy differ by alternative.

Table 1. Comparison of alternative outputs or effects.

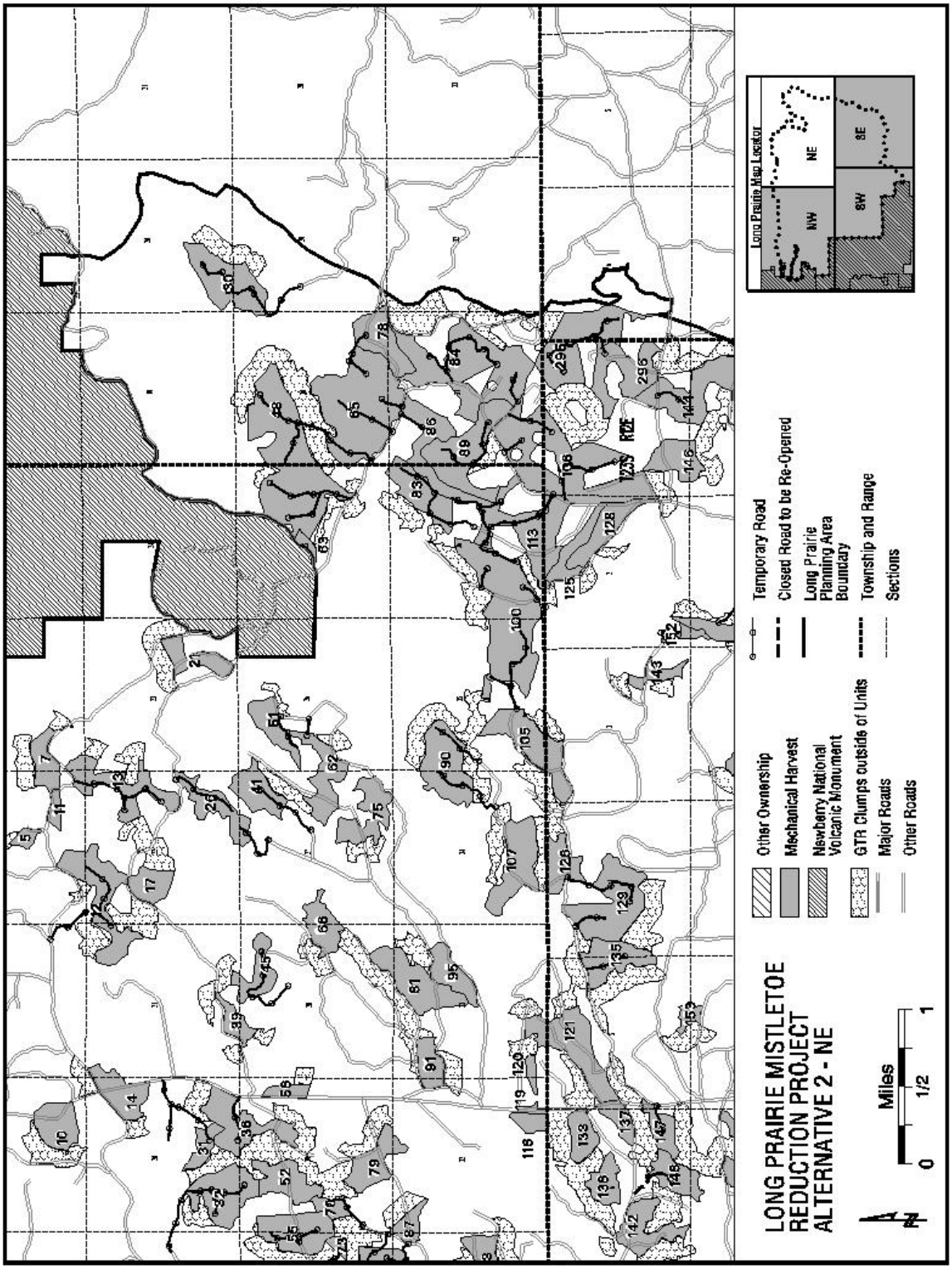
	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
Proposed Treatment Acres	0 acres	8,180 acres	11,455 acres
Treatment Acres by Management Allocation			
General Forest (GFO)	0 acres	7,573 acres	10,572 acres
Scenic Views			
Foreground – Partial Retention (SV2)	0 acres	528 acres	804 acres
Middleground – Partial Retention (SV4)	0 acres	79 acres	79 acres
Scenic Views Subtotal	0 acres	607 acres	883 acres
Treatment Method			
Commercial harvest	0 acres	8,180 acres	7,865 acres
Girdle/Prune/Fell and retain on site	0 acres	0 acres	3,590 acres
Total	0 acres	8,180 acres	11,455 acres
Estimated miles of temporary road construction	0 miles	43 miles	33 miles
Subsoiling to reduce detrimental soil compaction	0 acres	386 acres	422 acres
Treatment of trees without dwarf mistletoe (DMT)			
Removing trees with and without DMT	0 acres	8,180 acres	6,081 acres
Retaining trees without DMT	0 acres	0 acres	5,374 acres
Estimated Wood Fiber Volume to be harvested	0 CCF 0 MMBF	11,400 CCF 5.9 MMBF	11,000 CCF 5.7 MMBF
Green Tree Replacements (GTR) within treatment units			
Trees per acre (Weighted Average)	21 trees per acre	11 trees per acre	11 trees per acre
Trees per acre % of desired level (27 tpa)	77%	40%	40%
Treatment acres retaining >17 GTR/acre	11,630 acres	3,450 acres	5,513 acres
% of treatment acres retaining >17 GTR/acre	100%	30%	47%
Treatment acres retaining 2-6 GTR/acre	0 acres	8,180 acres	6,117 acres
% of treatment acres retaining 2-6 GTR/acre	0%	70%	53%
GTR clumps outside treatment units.	0 acres	5,140 acres	6,580 acres
GTRs within units and adjacent GTR clumps	Not applicable	32 trees/acre	31 trees/acre
GTRs within project area	35 trees/acre	31 trees/acre	30 trees/acre
Detrimental soil conditions (DSC) following harvest and soil restoration within units proposed for mechanical harvest.			
Number of Units with <=20% DSC			
Existing Condition		115 units	87 units
No Change		20 units	14 units
Increase, but within 20% LRMP Standard		94 units	71 units
Decrease		11 units	14 units
Number of Units with >20% DSC			
Existing Condition		88 units	109 units
No Change		7 units	17 units
Increase, but within 20% LRMP Standard		0 units	0 units
Decrease		71 units	80 units

Table 2. Comparison of proposed overstory treatment by alternative.

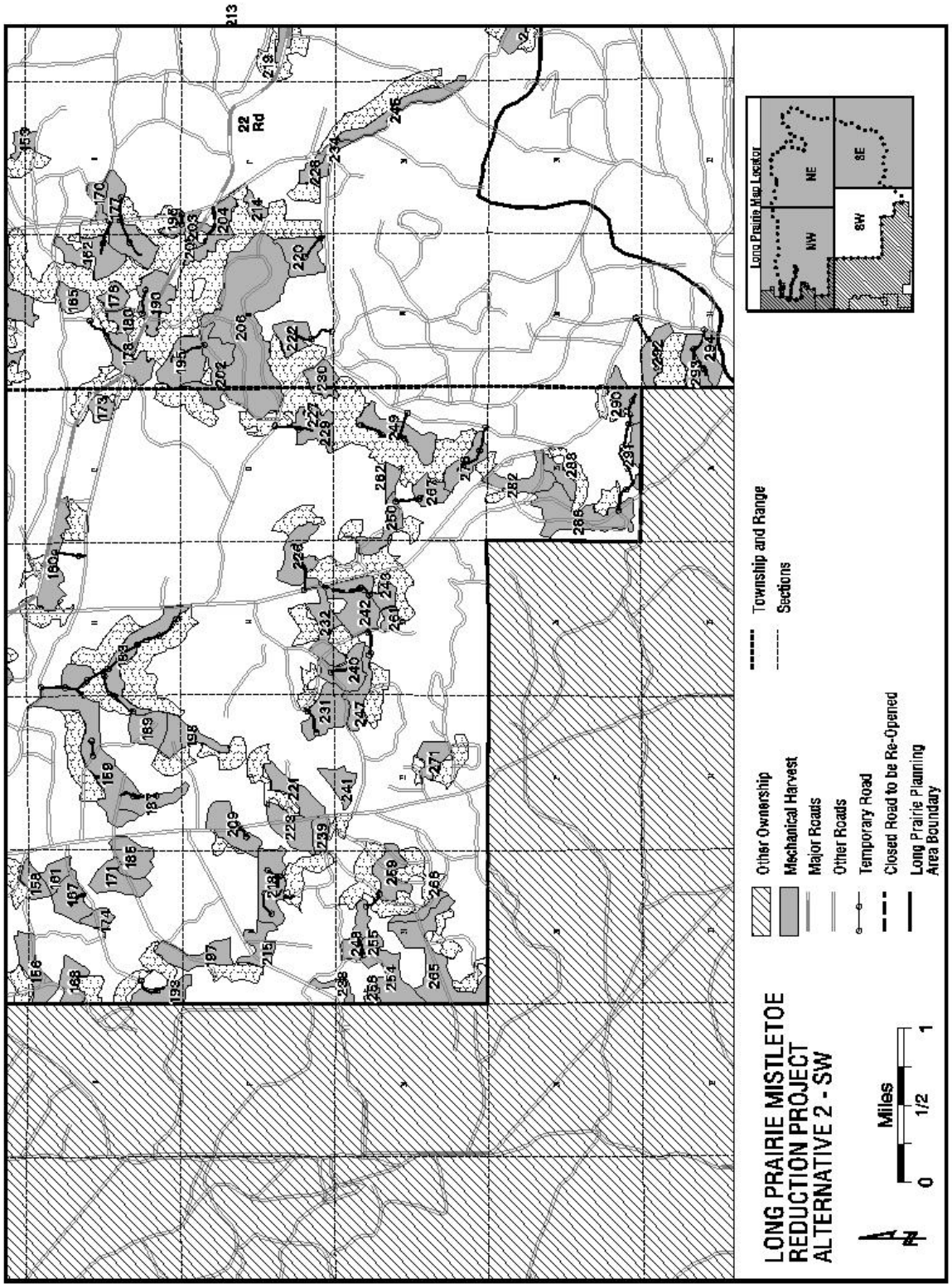
Overstory Treatment	Green Tree Replacement (GTR) Strategy	Alternative 2		Alternative 3	
		Acres	Percent of Total	Acres	Percent of Total
Lodgepole Pine Overstory					
Remove live lodgepole pine overstory trees ≥4 and <21 inches dbh excess to green tree replacement strategy.	Retain 3 lodgepole pine per acre ≥8 inches dbh. If present, ponderosa pine and white fir will provide additional GTRs.	7,070	86%	3,984	35%
	Retain lodgepole pine overstory without dwarf mistletoe in clumps within treatment unit.			1,203	10%
Remove live lodgepole pine overstory trees ≥4 and <21 inches dbh.	No retention of lodgepole pine is necessary. Ponderosa pine and white fir to provide GTRs.			648	6%
	No retention of lodgepole pine is necessary. Retain lodgepole pine overstory in clumps located outside treatment unit.			105	1%
Remove live lodgepole pine overstory trees ≥4 and <21 infected with dwarf mistletoe.	Retain lodgepole pine without dwarf mistletoe.			561	5%
Ponderosa Pine Overstory					
Remove live ponderosa pine overstory trees ≥4 and <21 inches dbh excess to green tree replacement strategy.	Retain 3 ponderosa pine per acre ≥8 inches dbh. If present, lodgepole pine and white fir will provide additional GTRs.	18	<1%		
Remove live ponderosa pine overstory trees ≥4 and <21 inches dbh infected with dwarf mistletoe.	No retention of ponderosa pine is necessary. Lodgepole pine to provide GTRs.			24	<1%
Lodgepole/Ponderosa Pine Overstory					
Remove live lodgepole and ponderosa pine overstory trees ≥4 and <21 inches dbh excess to green tree replacement strategy	Retain 3 lodgepole or ponderosa pine per acre ≥8 inches dbh. If present, white fir will provide additional GTRs	1,091	13%	1,320	12%
Remove live lodgepole and ponderosa pine overstory trees ≥4 and <21 inches dbh infected with dwarf mistletoe.	Retain lodgepole and ponderosa pine without dwarf mistletoe.			20	<1%
Girdle, prune, or fall and retain mistletoe infected lodgepole or ponderosa pine overstory trees ≥4 inches dbh.	Retain lodgepole and ponderosa pine without dwarf mistletoe.			3,590	31%
Total Treatment		8,179	99%	11,455	100%



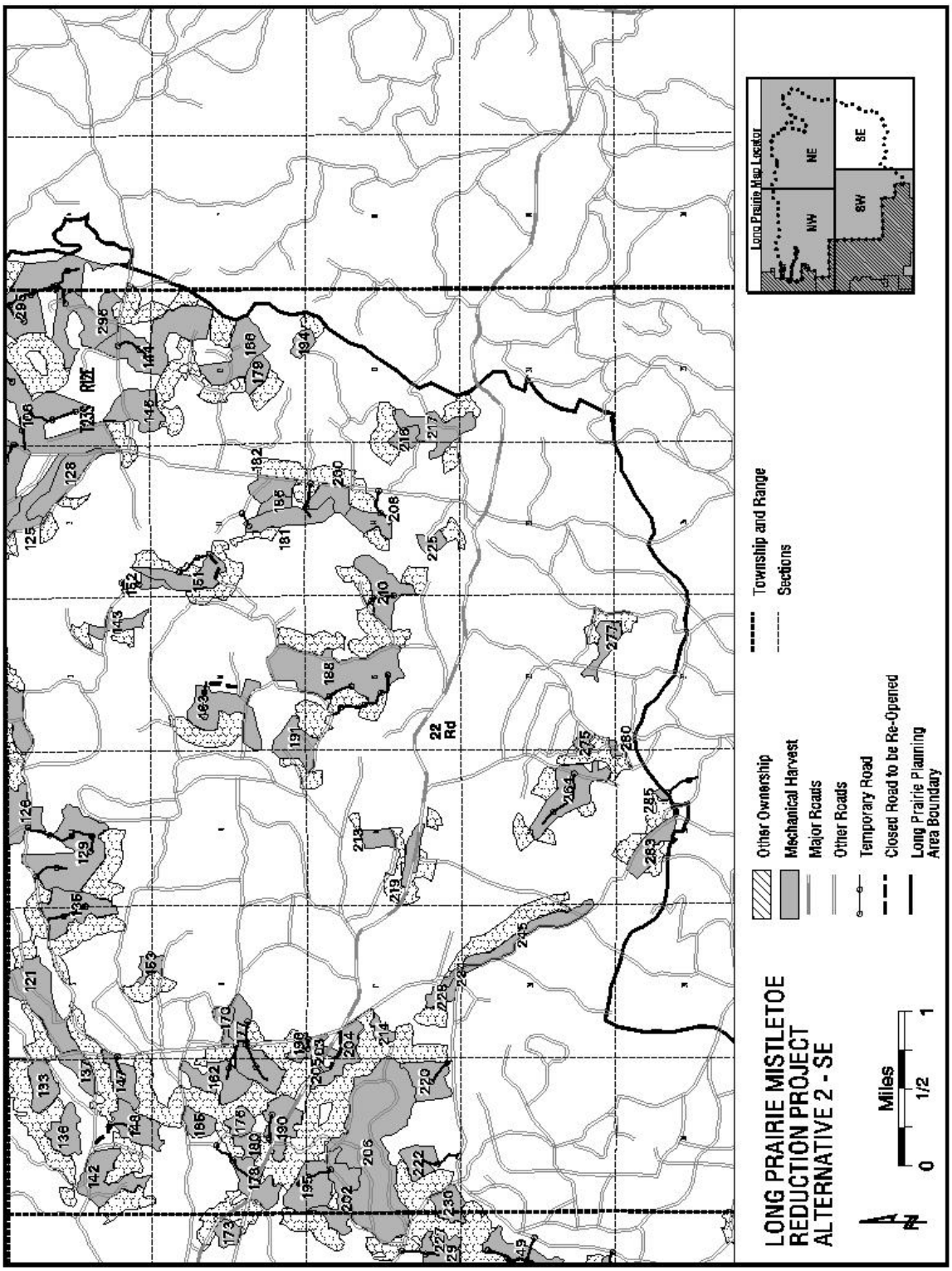
Map 3. Alternative 2, Northwest Quarter.



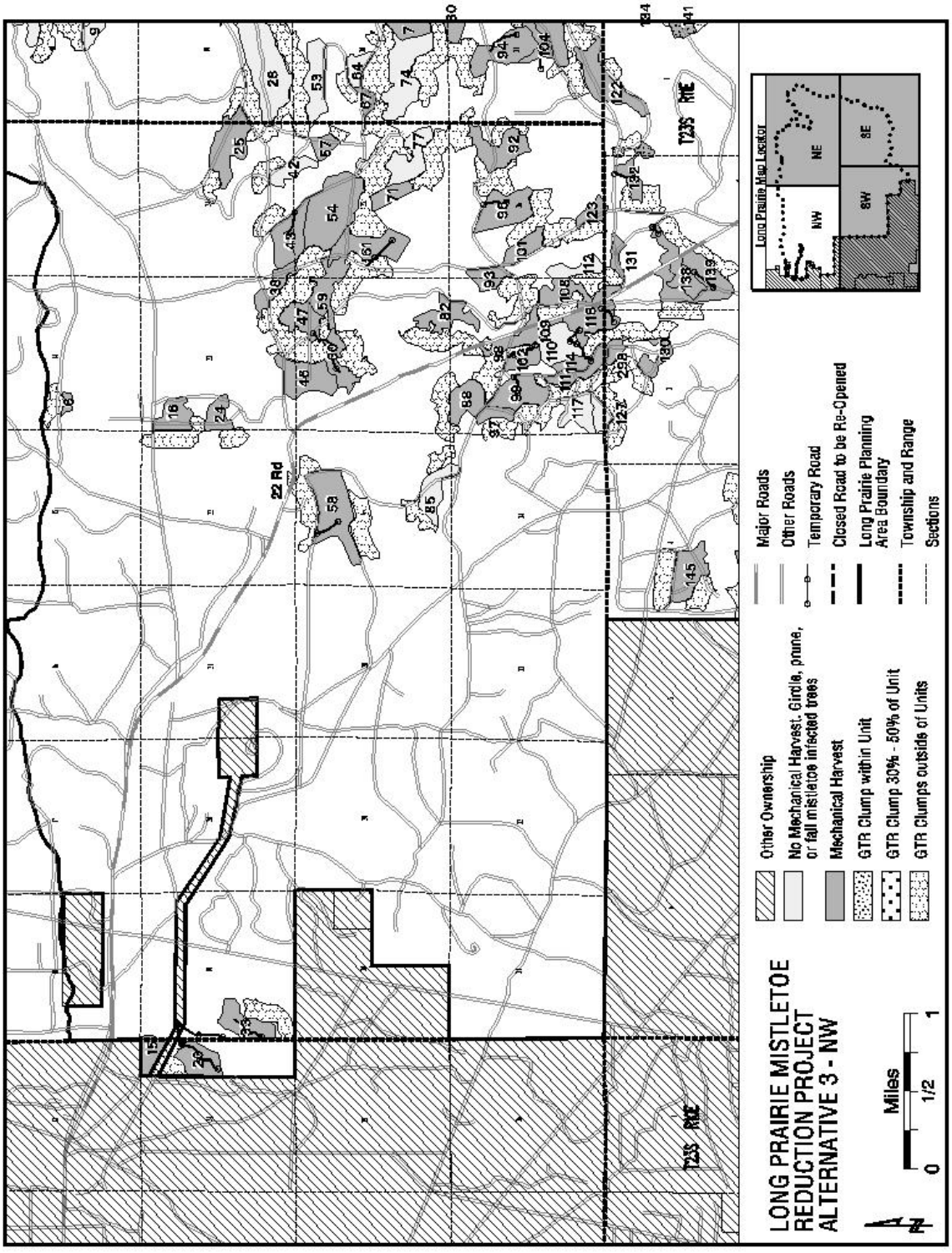
Map 4. Alternative 2, Northeast Quarter.



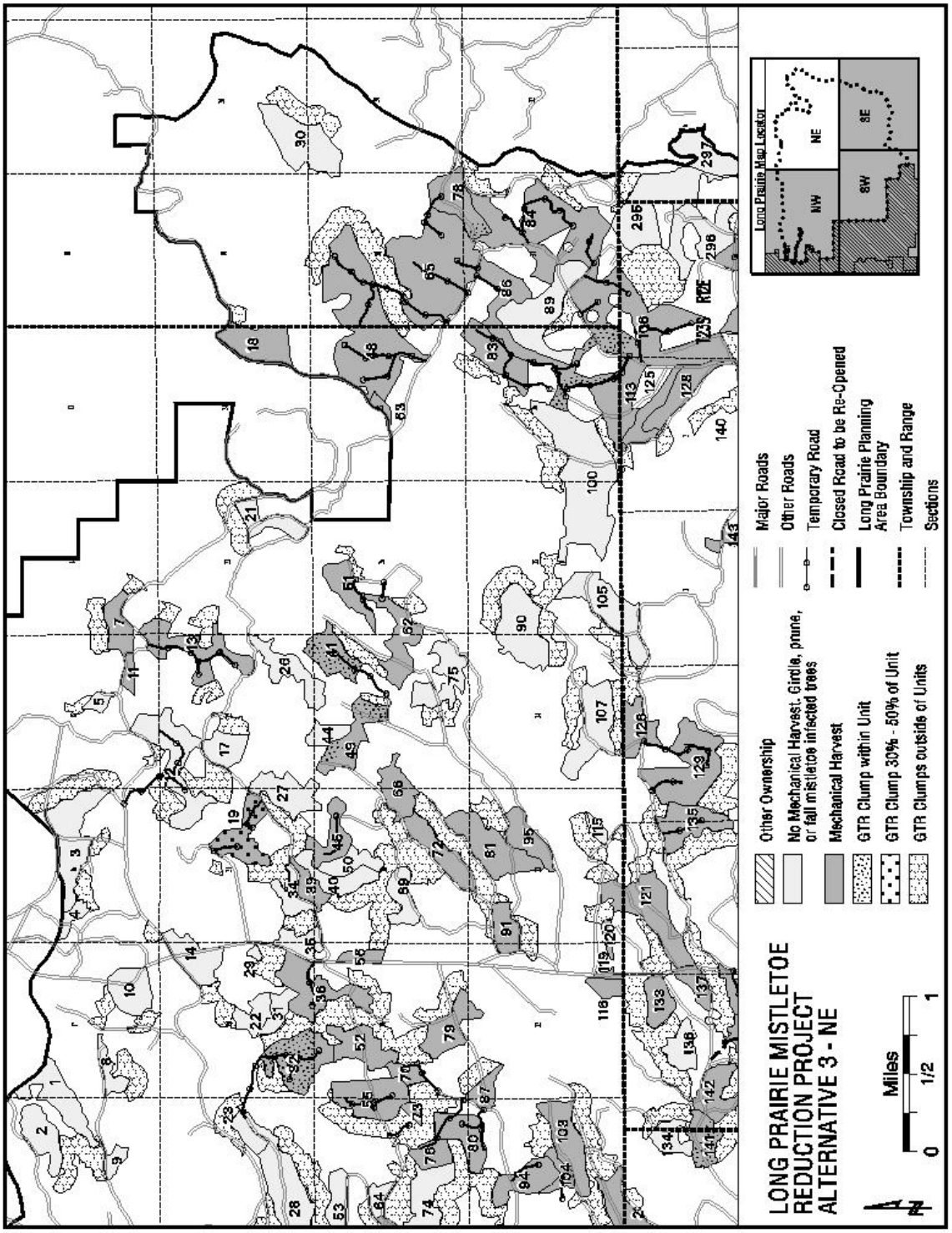
Map 5. Alternative 2, Southwest Quarter.



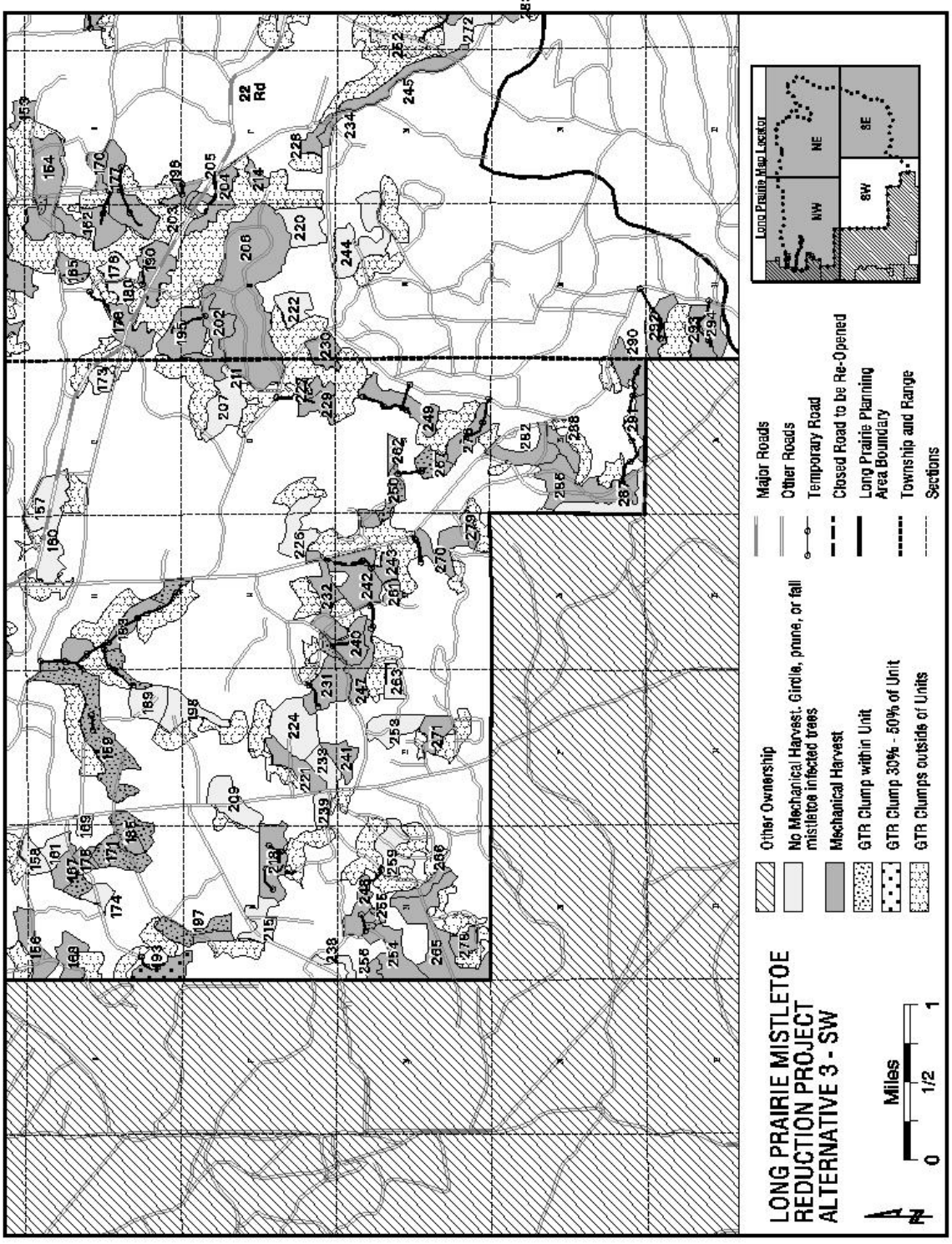
Map 6. Alternative 2, Southeast Quarter.



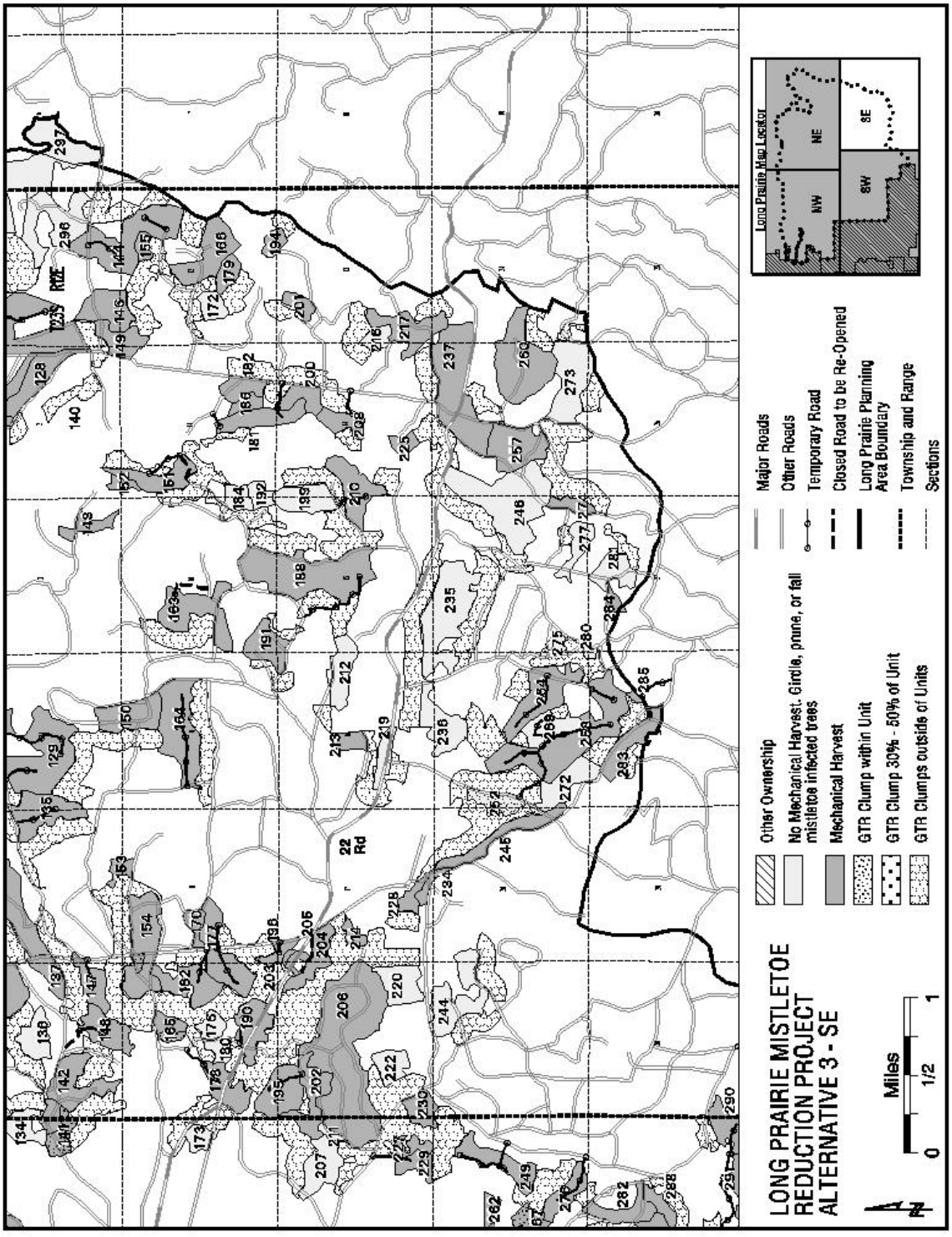
Map 7. Alternative 3, Northwest Quarter.



Map 8. Alternative 3, Northeast Quarter.



Map 9. Alternative 3, Southwest Quarter.



Map 10. Alternative 3, Southeast Quarter.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Vegetation/Trees

Effects to Vegetation/Trees are summarized from the Silviculturist's Report, which can be found in the project file.

Existing Condition

Table 3 shows the distribution of plant association groups (PAGs) and non-forest groups within the Long Prairie Project area. Lodgepole pine (*Pinus contorta*) is the dominant conifer species within the project area. Other conifers present include ponderosa pine (*Pinus ponderosa*) and white fir (*Abies concolor*). The three species occur together within the mixed conifer PAG. Lodgepole pine and ponderosa pine can occur together in any of the other PAGs.

Table 3. Vegetation and non-vegetation types within Long Prairie Project area.

Vegetation/Non-Forest Classification	% of Project area	% of Proposed Treatment	
		Alternative 2	Alternative 3
Forest Plant Association Groups (PAGs)			
Lodgepole pine (Wet and dry)	55%	76%	72%
Ponderosa pine (Wet and dry)	36%	22%	25%
Mixed Conifer (Dry)	8%	2%	3%
Non-Forest Groups			
Cinder/Lava/Rocks	1%		
Long Prairie Project area Total	100%	100%	100%

Table 4 compares the existing proportion of structural stages to the historic range of variability (HRV). Within the lodgepole pine plant association group (PAG), the amount of understory reinitiation is currently above HRV. All other structural stages, including late or old, are within HRV. Within the ponderosa pine and mixed conifer PAGs, the amount of multi-story without large trees is above HRV. The amount of single-story and multi-story Late or Old Structural stage (LOS) is currently below HRV. All other structural stages are within HRV.

Table 4. Comparison of existing structural stage to historic range of variability (HRV).

Structural Stage	Historic Range of Variability (HRV)	Existing Condition Alternative 1 (No Action)		Alternative 2 (Proposed Action)		Alternative 3	
		Acres and % of PAG	Relation to HRV	Acres and % of PAG	Relation to HRV	Acres and % of PAG	Relation to HRV
Lodgepole pine PAG (31,227 acres)							
Stand Initiation	15 – 50%	11,677 ac 37%	Within	15,176 ac 49%	Within	15,041 ac 48%	Within
Stem Exclusion, Closed Canopy	5 – 30%	2,791 ac 9%	Within	2,753 ac 9%	Within	2,758 ac 9%	Within
Understory Reinitiation	5 - 20%	9,417 ac 30%	Above (+10%)	7,255 ac 23%	Above (+3%)	7,330 ac 23%	Above (+3%)
Multi-story without Large Trees	5 – 20%	3,921 ac 13%	Within	2,622 ac 8%	Within	2,677 ac 9%	Within
Multi-story with Large Trees[1]	0 – 15%	2,667 ac 9%	Within	2,667 ac 9%	Within	2,667 ac 9%	Within
Single-story with Large Trees[1]	0 – 5%	754 ac 2%	Within	754 ac 2%	Within	754 ac 2%	Within
Ponderosa pine PAG (19,953 acres)							
Stand Initiation	0 - 15%	2,354 ac 12%	Within	3,676 ac 18%	Above (+3%)	3,629 ac 18%	Above (+3%)
Stem Exclusion, Closed Canopy	0 – 20%	1,588 ac 8%	Within	1,573 ac 8%	Within	1,574 ac 8%	Within
Understory Reinitiation	5 – 35%	5,292 ac 26%	Within	4,855 ac 24%	Within	4,657 ac 23%	Within
Multi-story without Large Trees	0 -20%	9,899 ac 50%	Above (+30%)	9,029 ac 45%	Above (+25%)	9,273 ac 46%	Above (+26%)
Multi-story with Large Trees[1]	5 – 25%	798 ac 4%	Below (-1%)	798 ac 4%	Below (-1%)	798 ac 4%	Below (-1%)
Single-story with Large Trees[1]	20 – 55%	22 ac <1%	Below (-20%)	22 ac <1%	Below (-20%)	22 ac <1%	Below (-20%)
Mixed Conifer PAG (3,999 acres)							
Stand Initiation	0 - 25%	882 ac 22%	Within	956 ac 24%	Within	897 ac 22%	Within
Stem Exclusion, Closed Canopy	0 – 20%	558 ac 14%	Within	557 ac 14%	Within	557 ac 14%	Within
Understory Reinitiation	5 – 35%	759 ac 19%	Within	703 ac 18%	Within	755 ac 19%	Within
Multi-story without Large Trees	0 -25%	1,404 ac 35%	Above (+10%)	1,387 ac 35%	Above (+10%)	1,394 ac 35%	Above (+10%)
Multi-story with Large Trees[1]	10 – 30%	353 ac 9%	Below (-1%)	353 ac 9%	Below (-1%)	353 ac 9%	Below (-1%)
Single-story [1]with Large Trees	15 – 50%	43 ac 1%	Below (-14%)	43 ac 1%	Below (-14%)	43 ac 1%	Below (-14%)

[1] Late or Old Structure (LOS)

Alternative 1

Direct and Indirect Effects

No treatments would occur to change species composition or proportion of structural stages.

Cumulative Effects

Gem Timber Sale (Appendix 3) will reduce the amount of lodgepole pine understory reinitiation structural stage by approximately 170 acres. The amount of ponderosa pine multi-story without large trees will be reduced by approximately 18 acres. There will be a corresponding increase in the amount of stand inititation structural stage. These changes are not great enough to change the proportion of structural stages displayed in Table 4. Other reasonably foreseeable future actions (Appendix 3) will have no cumulative effect on species diversity or existing proportion of structural stages.

Future natural disturbances could change the existing proportion of structural stages. High intensity wildfires have the greatest potential to create rapid, large-scale change. In the event of a high intensity wildfire, more of the stand initiation structural stage would be created. A wildfire or combination of wildfires would need to exceed 4,000 acres in size to put the amount of stand initiation above HRV in the lodgepole pine PAG (Table 5). Wildfires of greater than 100 to 600 acres would increase stand initiation above HRV in the ponderosa and mixed conifer PAGs (Table 5).

Table 5. Wildfire size that would put amount of stand initiation structural stage above historic range of variability.

Plant Association Group (PAG)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
Lodgepole pine	>4,060 acres	>300 acres	>625 acres
Ponderosa pine	>600 acres	Any size	Any size
Mixed conifer	>120 acres	>40 acres	>120 acres

Alternatives 2 and 3

Direct and Indirect Effects

Proposed treatments would not change existing diversity of tree species. While treatments would reduce overstory stocking, species currently present in the overstory would generally continue to be present in the overstory. Proposed treatments would not change the diversity of tree species in the understory.

Proposed pruning, girdling and felling treatment in Alternative 3 would generally not change the existing structural stage classification. The remaining treatments which would remove overstory trees would change the existing proportion of structural stages within the project area (Table 4). Removal of overstory trees would primarily decrease the amount of understory reinitiation and multi-story without large trees. With these decreases, there would be a corresponding increase in the amount of stand initiation structural stage. While the proportion of structural stages would change, there would generally be no change in the relation to historic range of variability. There would be one exception. Within the ponderosa pine PAG, the amount of stand initiation structural stage

would change from being within the historic range of variability to being approximately 3 percent above.

Cumulative Effects

As described for Alternative 1, the activities associated with the Gem Timber sale (Appendix 3) will change structural stages within areas of treatment. The extent of these changes will be small in relation to the Long Prairie planning area. Consequently, the proportion of structural stages displayed in Table 4 will not change for Alternatives 2 and 3 when considered in combination with the structural changes resulting from Gem. Other reasonably foreseeable future actions (Appendix 3) will have no cumulative effect on species diversity or existing proportion of structural stages.

High intensity wildfires would have potential to further increase the amount of stand initiation within the project area. Fires of any size within the ponderosa pine PAG, and fires 400 acres (Alternative 2) to 625 acres (Alternative 3) in the lodgepole pine PAG would result in the amount of stand initiation structural stage being above the historic range of variability (Table 5).

Forest Plan Consistency

Consistent with Interim Management Direction (Regional Forester's Forest Plan Amendment #2), the landscape has been characterized by biophysical environment for patterns of stand structure and has been compared to the Historic Range of Variability (HRV) (Table 9 and Silviculturist's Report). No harvest treatments are proposed within stands classified as late or old structure.

The proposed use of even-aged management in lodgepole and ponderosa pine stands is consistent with Forest Plan direction. The Forest Plan identifies that lodgepole pine should be managed using even-aged management (S&G TM-22). It also identifies uneven-aged management is most applicable in stands free of dwarf mistletoe (TM-32) and where dwarf mistletoe can be stabilized indefinitely at low infection levels.

Advanced regeneration present within proposed treatment areas will be retained and managed into the future (S&G TM-42).

Stands proposed for treatment are presently minimally stocked and will meet at least the minimum stocking requirements within 5 years of final overstory removal (S&G TM-49).

Within areas proposed for treatment, average height of understory ranges from 2 feet to 16 feet tall. Understory height commonly averages 4 to 5 feet. According to S&G TM-59, harvest units will no longer be considered openings when trees reach four and one-half feet tall. Proposed treatments will generally not result in newly created forest openings. In units no longer considered openings due to understory height, overstory removal would not create a new opening. In units still considered openings, within 5 years of final removal harvest, height of understory would be approximately four and one half feet and the areas would no longer be considered openings.

Proposed overstory removal in unit 121 could result in an opening that exceeds Forest Plan Standards and Guidelines. This unit is proposed for treatment in both Alternatives 2 and 3. Existing overstory is dense enough that the treatment area is currently not considered an opening. Proposed removal of the overstory could result in a created opening approximately 87 acres in size. This is larger than S&G TM-58 which indicates the Forest will conform to the Regional Guidelines on created forest openings. Regional guidelines allow for openings up to 60 acres when openings need to be expanded larger than 40 acres to avoid mistletoe infection.

Disease

The following information is summarized from the Silviculturist's Report, which can be found in the project file.

According to the FEIS for the Deschutes LRMP, dwarf mistletoe is widely distributed on the Deschutes National Forest. Based on the 1985 Vegetative Resource Survey, dwarf mistletoe occurs on an estimated 34% of the inventoried acres of ponderosa pine type and 66% of the lodgepole pine type.

Effects dwarf mistletoes have on their hosts include: 1) reduced height and diameter growth, 2) increased mortality, 3) reduced seed production and reduced seed viability, 4) reduced wood strength and increased knot size, 5) increased susceptibility to attack be insects, particularly bark beetles, and 6) increased flammability (Geils et al 2002, Hawksworth and Wiens 1996, Hawksworth 1978). Koonce and Roth (1980) describe the following effects mistletoe has on the flammability of ponderosa pine stands:

> Mistletoe may influence the frequency of fire by making stands more flammable. Mistletoe infected branches are often laden with resinous spindles and brooms which form fuel ladders leading to crowning fires. Fallen brooms persist in slash, increasing the amount of large, resinous, partially rotten, highly flammable material. In decadent stands, dwarf mistletoe increases the amount of dry, dead aerial fuel.

Hawksworth and Wiens (1996) identify some ecological effects of mistletoe:

> By inducing formation of witches' brooms and causing topkill and mortality of host trees, dwarf mistletoes affect the species composition, vertical crown structure, and spacing of trees within infected stands. These direct effects, in turn, have numerous consequences on the physical structure and functioning of the ecosystem. For example, the brooms provide forage, nesting, and cover for birds and mammals, but also increase the likelihood of ground fires becoming crown fires. Canopy gaps caused by mistletoe–induced mortality increase within-stand diversity but also reduce the interior-forest area.

Depending on management objectives and priorities, the effects of dwarf mistletoe are interpreted as positive, negative, or usually of mixed consequence (Geils et al 2002).

According to Geils et al (2002), the primary means by which a regenerated stand becomes infected with dwarf mistletoe is through infected residual trees left on the site. Other means by which mistletoe can spread, in decreasing order of importance are: infected advanced regeneration, spread from adjacent stands, and long-distance animal vectoring (Geils et al 2002).

Hawksworth (1978) identifies several characteristics of dwarf mistletoe that make it amenable to control: 1) Dwarf mistletoes are obligate parasites; they need a living host to survive. Once an infected tree or branch is cut, the mistletoe dies, and 2) Dwarf mistletoes are generally host specific.

Hawksworth and Wiens (1996) indicate removing infected overstory trees before regeneration is 1 meter tall or 10 years old is a strategy that reduces the likelihood of dwarf mistletoe spreading into the understory. Geils et al (2002) also present this as a strategy for preventing spread of mistletoe into cut blocks. A prevention method they also list is to avoid leaving single trees or small clumps of residual infected trees throughout the harvest area. Scattered overstory trees are a significant innoculum source for young, understory regeneration.

Existing Condition

Ponderosa pine dwarf mistletoe (*Arceuthobium campylopodum*) and lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) are widespread throughout the project area. Data from the Current Vegetation Survey (1993 to 1996) indicate lodgepole pine dwarf mistletoe is present on 61% of the survey plots that contain lodgepole pine. Ponderosa pine dwarf mistletoe is present on 27% of the survey plots in the project area that contain ponderosa pine. Lodgepole and ponderosa pine dwarf mistletoe are present on 19% of the plots that contain both lodgepole and ponderosa pine.

Dwarf mistletoe infected overstory is present in all areas proposed for treatment. Stand surveys indicate mistletoe occurrence is variable (Table 6). In approximately 35% of the stands surveyed, mistletoe distribution is patchy, with mistletoe infected overstory trees observed on less than 30% of the stand. In approximately 25% of the stands, infected overstory was observed over 30 to 60% of the stand. In the remaining 40% of stands, mistletoe is extensively distributed, with infected overstory trees observed in greater than 60% of the stand. The majority of treatment units have 4 to 10 infected overstory trees per acre. Approximately 15 to 25 percent of the units have more than ten infected overstory trees per acre. Mistletoe is also present in some understory trees.

Alternative 1

Direct and Indirect Effects

Existing lodgepole pine overstory trees in regeneration units could live another 30 to 40 years. Mistletoe infected ponderosa pine could live for 80 years or longer. As long as mistletoe infected overstory trees are present, understory trees would continue to be exposed to mistletoe seed. The number of understory trees infected with dwarf mistletoe would increase (mistletoe spread). Mistletoe spread to understory trees would also occur along the edge of stands where adjacent trees are infected with mistletoe. Birds and mammals would continue to spread minor amounts of mistletoe seed into the interior of

the unit. In addition to mistletoe spread, there would be an increase in the number of mistletoe plants on infected understory trees (mistletoe intensification). As mistletoe intensifies in the understory, the potential for understory tree growth would be reduced. Potential for the understory to utilize site growth potential, provide future large snag habitat, and develop into late or old structure would be decreased.

Table 6. Distribution of dwarf mistletoe in areas proposed for treatment.

Alternative	Percent of stand with infected overstory trees			
	<30%	≥30 to 60%	≥60%	Total
Alternative 1 (Existing)				
Acres	3,740	3,075	4,815	11,630
Alternative 2				
Acres (% of Existing)	3,005 (80%)	1,945 (63%)	3,230 (67%)	8,180
Alternative 3				
Acres (% of Existing)	3,685 (98%)	3,030 (98%)	4,740 (98%)	11,455
Acres of Trtmnt retaining trees without mistletoe (% of Existing)	1,935 (52%)	2,214 (72%)	1,225 (25%)	5,374

Mistletoe spread to the understory would be influenced by the number of infected overstory trees present within the unit. In a previous analysis (USDA Forest Service 1998), projections were made to compare potential for mistletoe spread assuming varying levels of infected overstory trees. The results of the projections are summarized in Figure 3. The fewer infected overstory trees per acre, the lower the potential for mistletoe spread. With one infected overstory tree per acre, understory throughout the unit could be exposed to mistletoe seed within a projected 90 to 100 years. With 20 or more infected overstory trees per acre, this time period would be reduced to 25 years. Understory farthest from the overstory source of mistletoe would generally be exposed to mistletoe seed at an older age than understory closest to the source of infection.

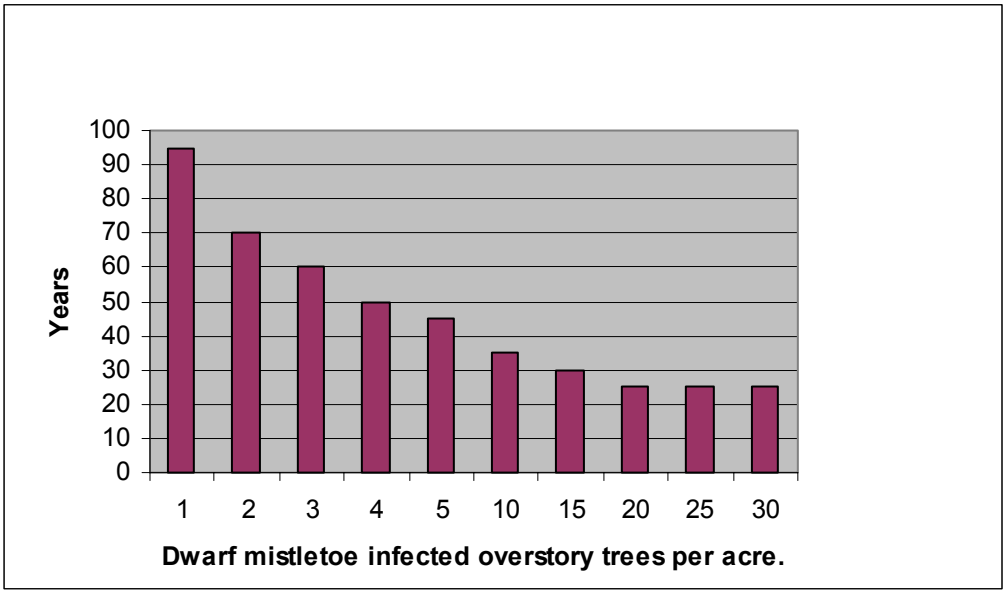


Figure 3. Years for dwarf mistletoe to spread across approximately 100 percent of an area.

The relatively low rate of mistletoe spread associated with one infected overstory tree per acre would be higher than the spread rate that would follow a stand replacing disturbance. Historically, stand replacement wildfires in ponderosa and lodgepole pine stands were approximately 50 to 1,000 acres in size (USDA Forest Service, 1994). Assuming this size range and no residual overstory with mistletoe, spread of mistletoe from the stand edges into the interior would be slow. With a stand size of 50 acres and an understory as old as 100 years, it is projected understory on only 35 percent of the stand would be exposed to mistletoe seed (USDA Forest Service, 1998). With a similarly aged understory in a 1,000 acre stand, understory on approximately 7 percent of the stand would be exposed to mistletoe seed (USDA Forest Service, 1998).

Mistletoe intensification would likely be influenced by infected overstory trees present in the unit. Within single-story stand structures, mistletoe has been found to intensify at a rate of approximately one dwarf mistletoe rating class every 14 to 18 years (Parmeter 1978 and Hawksworth and Johnson 1989). At this rate it would take approximately 40 to 55 years for dwarf mistletoe infection levels to reach a mistletoe rating of three (DMR 3). As a rule, the threshold level for growth reduction seems to be class 3, or when about one-half of the crown becomes infected (Hawksworth and Johnson 1989). Rate of mistletoe intensification in an understory growing beneath an infected overstory has not been quantified. It would be expected, however, within 30 to 60 feet of infected overstory, intensification of mistletoe in understory trees would be faster than rates observed in single-story stands. The upper crowns of these understory trees would be continually exposed to mistletoe seed from overstory trees. It would be difficult for understory trees to outgrow or stay even with the vertical spread of mistletoe.

As mistletoe intensifies, understory growth potential would decrease. Table 7 summarizes growth projections made for understories infected with dwarf mistletoe (USDA Forest Service, 1998). Projections compare growth of understories infected with mistletoe to growth of similar understories with no dwarf mistletoe infection. Projections can be used to compare growth potential assuming different levels of overstory mistletoe infection, not to give an absolute number for outputs. Least growth loss would occur where one or fewer overstory tree per acre is infected with dwarf mistletoe. More than a 10 percent loss in volume production is projected to occur where 3 overstory trees per acre are infected with dwarf mistletoe. The majority of regeneration units have 4 to 10 infected overstory trees per acre. Understory growth loss from dwarf mistletoe infection would be approximately 20 to 40 percent. Growth losses of 40 to 60 percent are projected where more than 10 overstory trees per acre are infected.

Reductions in stand volume reflect reduced growth in both diameter and height and increased mortality. Several studies show that severely infected stands produce only one-half to one-third the merchantable volume of timber expected from uninfected stands on comparable sites (Hawksworth and Wiens 1996). Hawksworth and Hinds (1964) found the following in lodgepole pine stands in Colorado:

Acceptable volumes cannot be obtained in stands that are infected while they are young. Merchantable volumes in 100-year-old stands infected for 70 years average only about 300 cu.ft./ac., compared with 2,350 cu.ft. per healthy stands of the same age on the same sites.

Table 7. Future volume (Merch. Cu. Ft.) of mistletoe infected stands expressed as a proportion of uninfected stand volume.

Number of Infected Overstory (Trees/Ac)	Ponderosa pine				Lodgepole pine			
	Understory Age 70[1]		Understory Age 100[2]		Understory Age 120[3]			
					Without Future Precommercial Thin		With Future Precommercial Thin	
	DMR[4]	% of Uninfected Volume	DMR	% of Uninfected Volume	DMR	% of Uninfected Volume	DMR	% of Uninfected Volume
1	0.8	93%	0.8	92%	1.6	100%	1.0	100%
3	1.2	83%	0.8	86%	3.4	81%	2.6	99%
5	1.7	76%	1.6	82%	4.0	81%	3.2	81%
10	2.9	69%	3.0	63%	4.5	61%	4.5	61%
15	3.7	61%	4.6	51%	4.7	43%	4.7	43%

[1] Managed Yield Table for the Deschutes National Forest Ponderosa pine working group (General Forest) indicates 95% of culmination of mean annual increment occurs between ages 55 and 75.

[2] Managed Yield Table for the Deschutes National Forest Ponderosa pine working group (General Forest) indicates culmination of mean annual increment occurs between ages 65 and 105.

[3] Managed Yield Table for the Deschutes National Forest Lodgepole pine working group (General Forest) indicates 95% of culmination of mean annual increment occurs between ages 95 and 135. Minimum age for lodgepole pine old growth is 120 years (USDA Forest Service, 1993).

[4] Dwarf Mistletoe Rating (DMR). A 6-class numerical rating system used to assess dwarf mistltoe infection levels in individual trees and stands (Hawksworth and Wien 1996). Trees with a DMR of 1 would be lightly infected. Trees with a DMR of 6 would be heavily infected.

Cumulative Effects

Future precommercial thinning could reduce the amount of mistletoe present in the understory. As long as mistletoe infected overstory trees are present, reductions in mistletoe gained through precommercial thinning would be short term. Long term reductions in stand growth resulting from mistletoe infection would still occur.

Alternatives 2 and 3

Direct and Indirect Effects

Overstory treatments proposed in Alternatives 2 and 3 would reduce the number of overstory trees infected with dwarf mistletoe. With fewer infected overstory trees, the rate at which mistletoe spreads and intensifies in understory trees would be reduced. Potential for the understory to utilize site growth potential, provide future large snag habitat, and develop into late or old structure would be increased.

With Alternative 2, approximately 60% of the acres proposed for treatment are in stands with mistletoe infected overstory distributed over 30 percent of the stand (Table 6). With Alternative 3, approximately 70% of the acres proposed for treatment are in stands with mistletoe infected overstory distributed over 30 percent of the stand (Table 6). Approximately 46% of the acres proposed for treatment in Alternative 3 would retain trees without dwarf mistletoe. Of this, approximately 80% would be in stands where dwarf mistletoe is found in less than 60 percent of the stand.

With both alternatives, overstory treatments would reduce, but not eliminate, the spread of mistletoe to understory trees. Mistletoe infected overstory would be generally reduced to 3 or fewer trees per acre. A portion of the live trees retained to provide future snag habitat (3 trees per acre) would likely be infected with dwarf mistletoe. Even with treatments designed to remove only infected overstory, it is likely trees with dwarf mistletoe would be retained. This would be due to the difficulty in some cases in seeing mistletoe in the overstory and infected overstory simply being missed during treatment implementation. Mistletoe spread to understory trees would occur along the edge of stands where adjacent stands are infected with mistletoe. Stands larger than 20 acres would have the least proportion of their area influence by the edge (Hawksworth and Johnson 1989). Birds and mammals would continue to spread minor amounts of mistletoe seed into the interior of the unit.

Proposed treatments would not reduce the amount of mistletoe currently present in understory trees. While most of the understory is presently free of mistletoe, there are places where mistletoe has already spread to older/taller understory trees. Infected understory trees less than 6 feet tall pose little threat of the spread of mistletoe to adjacent understory trees; infections are generally located in the lower half of the crown and dwarf mistletoe seed dispersal is minimal (Hawksworth and Wiens 1996).

Mistletoe intensification would be slower in understory trees than if infected overstory trees remained. With a reduced overstory source of mistletoe, fewer understory trees would have their upper crowns exposed to mistletoe seed. There would be greater potential for these understory trees to outgrow or at least stay even with the vertical spread of mistletoe. Intensification of mistletoe in the understory would be more comparable to rates of intensification in even-aged stands.

With reduced mistletoe spread and intensification, potential for understory to utilize site growth potential would be increased (Table 7). If all three trees retained for future cavity nesting habitat are infected with dwarf mistletoe, future growth losses resulting from mistletoe infection would be approximately 15 to 20 percent. While site growth potential would be better utilized, growth loss due to mistletoe would still be 5 to 10 percent higher than may be desirable according to LRMP direction. If less than 3 trees per acre are infected, future growth losses due to dwarf mistletoe may not exceed 10 percent.

Cumulative Effects

Future precommercial thinning would reduce the amount of mistletoe present in the understory. With at most 3 overstory trees per acre infected with mistletoe, there would be a better potential for precommercial thinning to reduce future volume losses resulting from understory mistletoe infection. Future growth losses due to dwarf mistletoe may not exceed 10 percent (Table 7).

Proposed, Threatened, Endangered, Sensitive Animals_

The project area contains no known sightings or suitable habitat for PETS animal species that are known to occur or potentially occur on the Bend-Fort Rock Ranger District. No

direct, indirect, or cumulative impacts to PETS animal species are expected under any alternative (see Biological Evaluation, project file).

Management Indicators and Species of Concern

Effects to Management Indicator Species and Species of Concern are summarized from the Wildlife Specialist's Report, which can be found in the project file.

Deer and Elk

Existing Condition

The entire project area consists of summer and transition range for mule deer that migrate to the Cascades in the summer months (transition range in the western half of the project area and summer range in the eastern half). A good distribution of foraging habitat exists in the project area. Most lodgepole pine stands do not contain thermal cover due to the amount of mortality or past harvests as a result of beetle epidemics. However, some of the existing regeneration is tall enough to mediate cold and heat. In stands of regeneration where there is some thermal value, the canopy is still discontinuous.

Hiding cover is defined as vegetation capable of hiding 90 percent of a standing adult deer or elk from view of a human at a distance equal to or less than 200 feet (Thomas 1979, Forest Plan WL-54). Hiding cover provides security to big game and protection from predators. Hiding cover is especially important for reducing vulnerability to hunting and poaching pressure by providing concealment in areas that have high open road densities and easy access by hunters. The Forest Plan requires evaluation of hiding cover in deer summer range (deer summer range includes the entire Forest outside the Deer Habitat (winter range) Management Allocation).

Ideally, hiding cover stands would be in close proximity to foraging areas and would make up approximately 30-40 percent of the land area (Forest Plan; Thomas 1979). The optimum distance between cover stands for maximum use by big game is thought to be approximately 1,200 feet with stand sizes ranging from 6 to 26 acres (Thomas 1979).

The analysis of hiding cover in the project area is based on previous hiding cover analyses conducted for the Woof Environmental Assessment (EA, 1994), Prairie Dog EA (1996), and Emerald EA (1996). In combination, these assessments cover the majority of the Long Prairie project area. Hiding cover quantities exceed the minimum Forest Plan standards and guidelines in the Long Prairie project area with ratios approximating ideal conditions based on Thomas, 1979. In many cases the amount of hiding cover has probably increased due to the increased growth of seedlings and saplings into taller trees.

Table 8 displays the existing amount (acres) of cover and the ratio of cover to foraging habitat in each of the implementation units within the Long Prairie project area. The applicable Forest Plan standards and guideline are also displayed.

Table 8. Existing Condition of Hiding Cover by Implementation Unit in the Long Prairie Project Area.

Implementation Unit (IU)	**Hiding Cover Ratio (cover: forage percent)**	**LMRP Standard & Guideline for Hiding Cover**
Woof		
IU #58	40:60	30%
IU #64	42:58	30%
Black Bark Pine areas (50-80 year old PP)	30:70	10% in black bark pine areas.
Prairie Dog		
IU #54	38:62	30%
Emerald		
IU #59	42:58	30%

Open road density in the project area averages 3.3 miles/square mile, which is approximately 0.8 miles per square mile over the open road density identified in the Forest Plan (2.5 mi/mi^2, TS-12).

Alternative 1

Direct and Indirect Effects

Under the No Action alternative hiding cover ratios would not change in the short-term. In the long-term, as the stands mature, hiding cover will be lost and thermal cover will increase. In the long term, mistletoe-related mortality could reduce or remove cover in localized areas.

There would be no change to open road density under the No Action alternative. Temporary roads would not be opened.

Cumulative Effects

Effects of the No Action alternative would be cumulative with the effects of other projects within the Paulina deer herd area, including fuel reductions, timber sales, and pre-commercial thinning. Adjacent projects would meet Forest Plan standards and guidelines for big game habitat, but would cause increased localized disturbance to big game until the projects are completed. Future precommercial thinning may impact hiding cover. Stands treated to reduce mistletoe infection in adjacent project areas are expected to provide future stands of lodgepole and ponderosa pine containing both cover and forage habitat in a mosaic pattern throughout these project areas. Over the landscape, there would be short-term cumulative effects (loss of cover and increased disturbance from road use) to big game herds as a result of other proposed projects. In the long-term (approximately 20 years) the cover will return and roads will be closed (likely to grow in with lodgepole pine).

Road closures planned and implemented under past and current projects together with the Spring Butte Green Dot road closures (a year-round restriction of road access administered by the Oregon Dept. of Fish and Wildlife) would reduce the open road density in the vicinity of the project area to approximately 2.8 miles per square mile.

Alternative 2

Direct and Indirect Effects

No proposed activities would take place within stands defined as thermal cover (stands with greater than 40% canopy closure). Hiding cover within units proposed for treatment is composed of regenerating trees in the understory. Overstory trees currently provide little hiding cover value due to the sparse nature of existing overstory stocking. Removal of overstory trees over approximately 8,180 acres is expected to have little or no impact on existing hiding cover. Access by mechanical equipment has the potential to create gaps in the understory, but use of designated skid trails for harvest will minimize damage to understories currently providing cover.

Under the action alternatives, open road densities would remain unchanged in the long-term. Short-term increases in open road densities would occur under the action alternatives as access is gained for commercial harvest. However, all roads opened to access treatment units will be closed upon completion of operations. It is apparent that infrequently used roads are quickly grown in with seedling/sapling lodgepole pine. Short-term increases in open road densities under the action alternatives may displace individual deer or elk, but no impacts to populations are expected.

Alternative 3

Direct and Indirect Effects

Effects of overstory removal over approximately 7,865 acres would be similar to those described under Alternative 2. No proposed activities would take place within stands defined as thermal cover (stands with greater than 40% canopy closure). Alternative 3 includes girdling, pruning, and felling (and retaining on site) of mistletoe-infected overstory trees over approximately 3,590 acres. There would be no treatments of existing understory, although some small and localized impacts to the understory may occur due to machinery operation (as described under Alternative 2). Because hiding cover is provided largely by the understory and not by the sparse overstory trees, these treatments would not impact available hiding cover. This alternative would retain more live overstory than Alternative 2, but this is not expected to affect big game, since the overstory is not currently contributing to either hiding or thermal cover.

Alternatives 2 and 3

Cumulative Effects

Effects of the Action alternatives would be cumulative with the effects of other projects, as described under the No Action alternative. Short-term, localized impacts to hiding cover may occur, especially due to thinning projects, but this habitat would recover as the understory responds to thinning. Overall, juxtaposition of hiding and thermal cover and foraging habitat would change, but target ratios would be maintained on the landscape.

Road closures planned and implemented under past and current projects together with the Spring Butte Green Dot road closures (a year-round restriction of road access administered by the Oregon Dept. of Fish and Wildlife) would reduce the open road density in the vicinity of the project area to approximately 2.8 miles per square mile.

Northern Goshawk

Existing Condition

In Oregon, goshawks tend to select mature or old-growth stands of conifers for nesting, typically those having a multi-layered canopy with vegetation extending from a few meters above ground to more than 40 meters high. Generally, nesting sites are chosen that are near a source of water and are on moderate slope, usually having northerly aspects. Foraging generally occurs within these mature stands where small openings occur. Important foraging habitat components include snags, logs, woody debris, openings, large trees, and herbaceous and woody understories. Goshawks typically forage on small mammals, grouse, woodpeckers, and passerines (Reynolds et al. 1992).

Portions of the project area were surveyed in the past under the Woof, Prairie Dog, and Emerald timber sales. One historic nest site is located within the project area, and was surveyed for goshawk presence in 2003; goshawks were located within the project area, but no active nest sites were identified. This site has not been known to be active since 1994/1995. Due to the amount of past harvest treatments as well as disease and infestation, goshawk nesting habitat is discontinuous.

Alternative 1

Direct and Indirect Effects

With the No Action alternative, no actions would be taken to reduce the spread of mistletoe to the understory in the project area. The potential for the understory to develop into the late or old structure habitat preferred by goshawks would be reduced (see Silviculture Specialist's report, project file, and the Disease section in this document).

Foraging habitat would likely improve across the project area in the next 30-40 years (lodgepole pine) to 80 years (ponderosa pine) as the mistletoe-infected overstory begins to die. Dead overstory trees with a dense young understory are good quality foraging habitat for goshawks; however, as the snags begin to fall, the habitat value would be reduced (Graham et al. 1999). Competition for prey species between goshawks and raptors that prefer open habitats (such as red-tailed hawks, great-horned, and barred owls) would likely increase.

Cumulative Effects

The effects of the No Action alternative would be cumulative with those of adjacent projects, including the Miscellaneous Postsale and Ponderosa Pine Release projects. Activities within these projects include treatment of mistletoe on an additional 70 acres, precommercial thinning, subsoiling, fuels reduction, and falling of whips. None of these activities would occur in currently suitable nesting habitat. It is likely that as a result of past and adjacent projects, goshawk habitat would continue to be limited in this part of the district in the short term; connectivity corridors, LOS areas, and old-growth areas would continue to function as the best habitat for nesting, foraging, and dispersal. Habitat suitability would continue to be limited in the project area, as described above, but adjacent projects are intended to increase the opportunity for treated stands to develop into LOS habitat.

Alternative 2

Direct and Indirect Effects

No treatments would occur in stands suitable for goshawk nesting. Overstory removal over approximately 8,180 acres would reduce the presence of mistletoe brooms, which are a habitat component for some prey species (e.g. blue grouse, Douglas squirrels); however, other foraging habitat components, such as snags, logs, openings, and herbaceous and woody understories, would not be affected in the short term. Retention of green tree replacements would help maintain future woodpecker habitat (see Wildlife Specialist's report, and the Green Tree Replacement section in this document); however, some changes in foraging opportunities may occur. As the understory matures, treatment stands are unlikely to become suitable forage habitat until stems are thinned or transition naturally through the stem exclusion phase. Treatments may increase the potential for foraging/prey base competition by red-tail hawks, great-horned owls, and barred owls.

In the long term, proposed actions would increase the opportunity for the treated stands to develop into the Late/Old Structure (LOS) habitat preferred for nesting.

Active goshawk nests that are found before or during management activities would be protected from disturbance during the nesting season (March 1 – August 31) as required by Forest Plan WL-3 (see Mitigation #10). Although the historic goshawk nest within the project area has not been known to be active since the mid-1990s, its stand will be protected during the nesting season (see Wildlife Specialist's report, project file, and Mitigation #11).

Alternative 3

Direct and Indirect Effects

Alternative 3 would reduce the presence of mistletoe brooms over approximately 11,455 acres. Effects of overstory removal over 7,865 acres would be similar to those described under Alternative 2. Alternative 3 proposes to maintain more of the existing overstory structure by pruning and girdling mistletoe-infected trees over approximately 3,590 acres. Infected overstory trees may also be felled and left on-site over these acres. Foraging habitat would be maintained or improved over these acres through snag creation (girdling) and increased recruitment of coarse woody material (felling). Retention of GTRs would also help maintain foraging habitat.

Mitigations described under Alternative 2 would apply to Alternative 3.

Alternatives 2 and 3

Cumulative Effects

Effects of the Action alternatives would be cumulative with the effects of other projects, as described under the No Action alternative. Short-term, localized impacts to hiding cover may occur, especially due to thinning projects, but this habitat would recover as the understory responds to thinning. Overall, juxtaposition of hiding and thermal cover and foraging habitat would change, but target ratios would be maintained on the landscape.

Road closures planned and implemented under past and current projects together with the Spring Butte Green Dot road closures (a year-round restriction of road access

administered by the Oregon Dept. of Fish and Wildlife) would reduce the open road density in the vicinity of the project area to approximately 2.8 miles per square mile.

Compliance with Forest Plan Direction (Alternatives 1, 2, and 3)

The Eastside Screens provide direction for goshawk habitat management on the Deschutes National Forest. In summary, it states that all active and historic goshawk nests will be protected from disturbance, with a 30 acre no harvest buffer around the nest tree and designation of a 400 acre post-fledging area that will retain LOS stands and enhance younger stands to become LOS (Interim wildlife standard Scenario A, (5) Goshawks, a-c pages 12-13). An historic nest site is defined as one that has had nesting activity within 5 years prior to the date of the Screens (1994/1995, page 13). The goshawk nest site located within the project area was last known active in 1987. This predates the screens definition for needing to establish a nest core and PFA. However, to err on the side of caution, Mitigation #11 places a seasonal restriction on disturbing activities within ¼ mile of the nest site. Mitigation #10 addresses any new nesting activity discovered during project implementation.

Cooper's and Sharp-Shinned Hawks

Existing Condition

Coopers Hawk

The Cooper's hawk prefers 50 to 80 year old conifer stands with a closed canopy for nesting. Its habitat consists of dense forests intermixed with openings. Where the species occurs in extensive forests, it is more likely to be found near forest edges, along roads or clearings, or at a forest opening such as stream or lake edges. Surveys of historic Cooper's hawk nest sites conducted in 2003 within the project area found two active nest sites. Neither one of these sites is within a proposed unit, but both are within 0.25 mile of some units.

Sharp-Shinned Hawk

The sharp-shinned hawk prefers nest groves of even aged stands of 40 to 60 year old conifers with a dense canopy. Nesting can occur in dense stands of second growth trees beneath an over-mature overstory. There are no known active or historic sharp-shinned hawk nest sites associated with the project area.

Alternative 1

Direct and Indirect Effects

Effects of the No Action alternative would be similar to those for the northern goshawk. The opportunity for stands to develop into Late/Old Structure would be reduced. There would be no risk of disturbance to nesting birds.

Cumulative Effects

Cumulative effects to these species would be similar to those discussed for the northern goshawk.

Alternatives 2 and 3

Direct and Indirect Effects

The newly located Cooper's hawk nest sites will be buffered from management activities during the nesting season (Forest Plan WL-3 and Mitigation #9). Effects to the habitat of these species generated by the action alternatives are similar to that of the northern goshawk. Any negative impacts to local Cooper's and sharp-shinned hawk populations are expected to be limited to increased foraging competition from other raptor species as a result of proposed treatments.

Active Cooper's or sharp-shinned hawk nests that are found before or during management activities would be protected from disturbance during the nesting season (April 15 – August 31) as required by Forest Plan WL-19 (see Mitigation #10).

Cumulative Effects

Cumulative effects to these species would be similar to those discussed for the northern goshawk.

In taking into account all accipiter species (goshawk, Cooper's hawk and sharp-shinned hawk), the project area will transition in suitability, with short-term gaps in habitat suitability. The areas of mixed conifer and stands closest to the old-growth areas will likely have goshawk nesting habitat develop the soonest. Otherwise, all of the treatment units will likely develop into sharp-shinned hawk nesting habitat first, then as the trees age it will develop into Cooper's hawk habitat, and then finally into LOS (goshawk habitat). In some of the pure lodgepole stands, high quality goshawk nesting habitat may never develop, but these stands would provide foraging and fledging habitat as well as Cooper's and sharp-shinned hawk nesting habitat.

Red-tailed Hawk

Existing Condition

This species has an extremely wide tolerance for habitat variation. Generally the species prefers open woodland areas associated with forest edges and large trees for nesting. The project area provides abundant foraging habitat, due to its high amount of fragmentation. This species is known to utilize mistletoe brooms as habitat (either as platforms for nesting or as prey habitat).

Alternative 1

Direct and Indirect Effects

Under the No Action alternative, existing habitat conditions would remain unchanged in the short-term. The existing overstory would begin to die in approximately 30-40 years (lodgepole pine) to 80 years (ponderosa pine); habitat would become more open as the snags eventually begin to fall. The spread of mistletoe throughout the project area may improve habitat quality by providing more mistletoe brooms for nesting and prey habitat.

Under the No Action alternative, no treatments to improve the soil condition would take place; detrimental soil conditions would not be decreased, and the opportunity for

revegetation of units with detrimental soil conditions, and the subsequent improvement of small mammal habitat, would not be created.

Cumulative Effects

The effects of the No Action alternative would be cumulative with adjacent projects, as described in previous sections. Thinning, mistletoe treatment, and fuels reduction projects in adjacent areas would continue to provide the mosaic of openings and wooded areas preferred by the red-tailed hawk. No negative cumulative impacts to this species are anticipated.

Alternative 2

Direct and Indirect Effects

Alternative 2 would increase foraging effectiveness for red-tails by removing overstory trees (under 21" dbh) and increasing access to prey at ground level over 8,180 acres. In the short-term, red-tailed hawks will be at an advantage against other competitors (e.g. goshawks) for hunting. Foraging habitat, however, will diminish in the long-term, as more vigorous understory trees respond with accelerated growth. No nesting habitat would be removed.

Soil restoration activities would decrease detrimental soil conditions in 82 units, creating the opportunity for vegetative recovery and subsequent improvement of small mammal habitat.

Active red-tailed hawk nests that are found before or during management activities would be protected from disturbance during the nesting season (March 1 – August 31) as required by Forest Plan WL-3 (see Mitigation #10).

Alternative 3

Direct and Indirect Effects

Alternative 3 would increase foraging effectiveness for red-tails by removing overstory trees (under 21" dbh) and increasing access to prey at ground level over 7,865 acres. Girdling/pruning/felling activities over 3,590 acres would retain more of the existing overstory, but would also provide additional prey habitat, potentially benefiting the prey base. In the short-term, red-tailed hawks will be at an advantage against other competitors (e.g. goshawks) for hunting. Foraging habitat, however, will diminish in the long-term, as more vigorous understory trees respond with accelerated growth. No nesting habitat would be removed.

Soil restoration activities would decrease detrimental soil conditions in 94 units, creating the opportunity for vegetative recovery and subsequent improvement of small mammal habitat.

Active red-tailed hawk nests that are found before or during management activities would be protected from disturbance during the nesting season (March 1 – August 31) as required by Forest Plan WL-3 (see Mitigation #10).

Alternatives 2 and 3

Cumulative Effects

Nesting habitat would not be affected by other projects in the area, due to retention of all trees greater than or equal to 21" dbh (Eastside Screens) and the requirement to protect known nest sites (Forest Plan WL-3). Thinning, mistletoe treatment, and fuels reduction projects in adjacent areas would continue to provide the mosaic of openings and wooded areas preferred by the red-tailed hawk. No negative cumulative impacts to this species are anticipated.

Golden Eagle

The golden eagle occurs in grass-shrub, shrub-sapling, and young woodland growth stages of forested areas, or in forest with open lands nearby for hunting. Essentially it needs a favorable nest site, usually a large tree or cliff, a dependable food supply, mainly of medium to large mammals and birds, and broad expanses of open country for foraging. It favors hilly or mountain country, where take off and soaring are facilitated by updrafts; deeply cut canyons rising to open sparsely treed mountain slopes and crags represent ideal habitat.

Existing Condition

There are no known golden eagle nest sites or home ranges in the Long Prairie project area. Although the project area contains potential foraging habitat, it does not contain favorable nest sites for this species.

Alternatives 1, 2 and 3

Direct, Indirect and Cumulative Effects

None of the alternatives would affect existing potential habitat in the project area. Active golden eagle nests that are found before or during management activities would be protected from disturbance during the nesting season (February 1 – August 31) as required by Forest Plan WL-3 (see Mitigation #10).

American Marten

The American marten prefers large, somewhat dense, stands of lodgepole pine, mixed conifer, and mountain hemlock. Abundant coarse woody material (CWM) in these stands is important to support a rodent prey base (Forest Plan WL-61). Mistletoe brooms have been reported as providing habitat for marten (Bull et al. 1997).

Existing Condition

The project area consists of approximately 55% lodgepole pine. The project area currently provides marginal habitat due to fragmentation and low amounts of coarse woody material, as well as low density stands; the best available habitat within the project area is currently provided by LOS, connectivity corridors, and old-growth stands. The project area has the potential of providing foraging and dispersal habitat during winter months.

Alternative 1

Direct and Indirect Effects

With the No Action alternative, no actions would be taken to reduce the spread of mistletoe to the understory in the project area. The potential for the understory to develop into the late or old structure habitat preferred by American martens would be reduced (see Silviculture Specialist's report, project file, and the Disease section in this document).

Habitat would likely improve across the project area in the long-term (30-40 years for lodgepole pine and 80+ years for ponderosa pine) as the overstory begins to die and eventually fall, increasing the CWM habitat component.

Alternative 2

Direct and Indirect Effects

No current suitable habitat or connective habitat would be impacted by proposed treatments. The removal of the overstory has the potential to limit future down wood recruitment for marten foraging and denning in the project area. However, this would occur in an area already identified as marginal habitat and treatments would not contribute to removal of habitat. In the long-term, removing the overstory trees infested with mistletoe would reduce the risk of further infecting the understory with mistletoe, which would increase the opportunity for the understory to develop into LOS.

Alternative 2 does not propose to implement any commercial salvage units; therefore existing coarse woody material would not be removed within the project area. There will be long-term beneficial affects to marten habitat as a result of these alternatives due to the promotion of future LOS, which in turn provides potential denning and foraging habitat for the marten.

Mistletoe reduction may limit availability of mistletoe brooms in treatment units, but the ubiquitous presence of mistletoe on the landscape ensures availability of this unique feature outside treatment areas.

Alternative 3

Direct and Indirect Effects

Alternative 3 would reduce the presence of mistletoe brooms over approximately 11,455 acres. Effects of overstory removal over 7,865 acres would be similar to those described under Alternative 2. Alternative 3 proposes to maintain more of the existing overstory structure by pruning and girdling mistletoe-infected trees over approximately 3,590 acres. Infected overstory trees also may be felled and left on-site over these acres. Marten habitat would be improved over these acres through increased recruitment of coarse woody material (felling). In the long term, girdled trees (created snags) and naturally occurring snags would fall, also increasing CWM in the project area. Proposed treatments would improve marten habitat in the long term by increasing the opportunity for understories to develop into LOS habitat.

Alternatives 1, 2 and 3

Cumulative Effects

The effects of all alternatives would be cumulative with those of adjacent projects, including the Miscellaneous Postsale and Ponderosa Pine Release projects. Activities within these projects include treatment of mistletoe on an additional 70 acres, precommercial thinning, subsoiling, fuels reduction, and falling of whips. Although adjacent projects would retain CWM to meet Forest Plan standards and guidelines, this habitat component may continue to be limiting until retained overstory trees begin to die and fall. Adjacent projects are designed to improve health and vigor of lodgepole pine overstories and increase the opportunities for stands to develop into LOS habitat, and thus may cumulatively improve future marten habitat in the vicinity of the project area.

Neotropical Migratory Birds (NTMB)

Neotropical migratory birds (NTMB) have recently become species of concern, due to the downward trend of landbirds in the West. The decline of these populations is a result of many complex issues, but factors believed to be responsible include loss, fragmentation, and alteration of historic vegetation communities. There is currently a Memorandum of Understanding between the Forest Service and the U.S Fish and Wildlife Service (USFWS) (January 2001) that provides for enhanced cooperation between the Forest Service and USFWS (Executive Order 131186). Specific activities are identified where cooperation between the parties will substantially contribute to conservation and management of migratory birds, their habitat, and associated values, and thereby advance many of the purposes of the Executive Order. The USFWS Director's Order No. 131 makes clear the requirements for obtaining permits from the USFWS for activities involving the intentional take of birds. There is no mechanism currently in place to authorize or exempt the unintentional take of migratory birds by federal agencies. Additionally, federal agencies are developing memoranda of understanding with the USFWS to further migratory bird conservation as called for by the Order.

The Deschutes NF is currently following guidelines from the "Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington" (Altman 2000). This conservation strategy addresses key habitat types as well as biological objectives and conservation strategies for these habitat types found in the east-slope of the Cascade Mountains, and the focal species that are associated with these habitats. The conservation strategy lists priority habitats: 1. Ponderosa Pine; 2. Mixed Conifer (Late Successional); 3. Oak-Pine Woodland; 4. Unique Habitats. There is no Oak-Pine Woodland habitat within the project area, and the small amounts of Late Seral Mixed Conifer will remain untreated.

Ponderosa Pine

Ponderosa pine forests have incurred one of the most widespread and strongest declines among habitat types in analysis of source habitats for terrestrial vertebrates in the Interior Columbia Basin (USDA/USDI 1997). Within the Northern Cascades, Southern Cascades, and Upper Klamath Ecological Reporting Units of the Interior Columbia Basin

Assessment, old forest, single overstory ponderosa pine habitat has declined by 97, 55, and 18% respectively (USDA/USDI 1997). The result of degradation of ponderosa pine forest from fire suppression and extensive timber harvest has been the change of large areas of late-seral ponderosa pine forest to mid-seral stands of Douglas fir and grand/white fire. Because the extensive loss of ponderosa pine forest, habitat restoration is the most important strategy for conservation of landbirds associated with this habitat type. The desired condition in ponderosa pine forest is a large tree, single layered canopy with an open, park-like understory dominated by herbaceous cover with scattered shrub cover and pine regeneration. Ponderosa pine forest within the East-Slope Cascades Landbird Conservation planning unit occurs extensively at low elevations in all the subprovinces except Columbia Foothills where it is a minor component.

Landbird conservation in ponderosa pine forest emphasizes maintaining healthy ecosystems through representative focal species for four habitat conditions. These include large patches of old forest with large snags and trees, an open understory with regenerating pines, and patches of burned old forest.

Unique Habitats

Landbird conservation is also directed toward several unique habitats in the East-Slope Cascades. Unique habitats include lodgepole pine and white-bark pine old growth, and wet and dry meadows.

Existing Condition

Table 9 summarizes priority habitats, habitat features, and focal species that are found in the High Lava Plains Subprovince associated with the project area.

Table 9. Priority habitat features and associated focal species for conservation of the East-Slope Cascades Landbird Conservation Planning Region.

Habitat	Habitat Feature/ Conservation Focus	Focal Species by Subprovince Central Oregon/Klamath Basin
Ponderosa Pine	large patches of old forest with large snags	white-headed woodpecker
	large trees	pygmy nuthatch
	open understory with regeneration pines	chipping sparrow
	patches of old burned forest	Lewis' woodpecker
Lodgepole Pine	old growth	black-backed woodpecker
Meadows	wet/dry	sandhill crane

The project area comprises approximately 55% lodgepole pine PAGs, 36% ponderosa pine PAGs, and 8% mixed conifer PAG; there is no meadow habitat in the project area. Currently, very little of the project area is in a LOS condition; approximately 11% of the lodgepole pine PAGs, less than 5% of the ponderosa pine PAGs, and 10% of the mixed conifer PAG is in LOS (see Table 4).

Several landbirds utilize habitat potentially influenced by proposed treatments, including dusky flycatcher, western bluebird, and chipping sparrow. The dusky flycatcher is a tree-nester that uses open-overstory ponderosa pine and lodgepole pine; the western bluebird

is known to use open habitat and occasionally use mistletoe clumps, while the chipping sparrow is a ground-nester that uses similar stands as the flycatcher (Marshall et al. 2003).

Alternative 1

Direct and Indirect Effects

Under the no action alternative, there would be no risk of intentional or unintentional take of any landbirds. The existing condition would not be changed in the short term. Existing overstories would begin to die in approximately 30-40 years (lodgepole pine) to 80 years (ponderosa pine), increasing habitat for snag-dependent species. Mistletoe infection would spread to understories, and would likely slow the development of these stands into LOS.

Alternative 2

Direct and Indirect Effects

This alternative is expected to have no influence on Late and Old structure ponderosa pine stands. Within the lodgepole and ponderosa pine treatments, stand health is the primary motivation behind the mistletoe reduction treatments. A gap in snag production within units will occur, but overall snag recruitment is likely to remain constant on the landscape with the designation of leave areas containing 100% MPP for green tree replacements.

By reducing overstory densities, Alternative 2 may degrade or remove nesting habitat for the flycatcher and chipping sparrow. Alternative 3 is likely to remove potential nesting habitat within proposed treatment units outside untreated clumps. Alternative 2 is expected to retain 4,900 acres of suitable habitat, while Alternative 3 would retain 4,780 acres. Proposed treatments would not preclude occurrence of these species, but may limit nesting within portions of the project area. Removal of mistletoe trees may remove a potential habitat component for bluebirds, but would not affect the availability of snag habitat for this secondary-cavity nesting species.

No intentional take of migratory birds is expected to occur as result of Alternative 2.

Logging activities in the spring and summer may reduce local populations of NTMBs, but are not expected to compromise population viability at the landscape level due to the scattered nature of timber harvest operations during the nesting season.

Disturbance during the nesting season caused by logging may interrupt nesting or cause nest failures for some breeding pairs. Since the project proposes to treat live trees of small diameter in open canopies, the potential for impacts to land birds is expected to be minor.

Alternative 3

Direct and Indirect Effects

Effects would be similar to those described under Alternative 2. Alternative 3 would provide additional snag habitat by girdling mistletoe infected trees over approximately 3,590 acres. No intentional take of migratory birds is expected to occur as result of the project.

Alternatives 1, 2 and 3

Cumulative Effects

Treatments under the Miscellaneous Postsale Project would complete 70 acres of mistletoe removal in the near future. Other projects scheduled to occur near the Long Prairie project area are one timber sale (Edge, along the 2225 road) and precommercial thinning projects (e.g. Gem). In the short-term, habitat for those bird species that utilize open canopy and small tree habitat will increase over the landscape. As the proposed treatments increase tree growth, habitat for close-canopied forest species will then increase. Similar to the discussions for other LOS and close-canopied dependent species there will be a short-term gap in high quality habitat availability.

Bats

Several bat species may use the project area, including small-footed myotis, long-eared myotis, long-legged myotis, Yuma myotis, and western big-eared bat. Bat habitat includes caves, rock crevices, trees and large snags.

Existing Condition

There is one known cave in the project area; surveys have indicated the presence of at least two species of *Myotis*. There is very little large snag habitat present within the project area.

Alternative 1

Direct and Indirect Effects

Habitat condition would remain unchanged in the short-term. Mistletoe infection may limit the growth potential of existing ponderosa pine in the project area, decreasing the opportunity for these trees to develop into the large snag habitat used by some bat species.

Alternatives 2 and 3

Direct and Indirect Effects

The alternatives do not propose the removal of any large trees that are > 21" dbh (potential habitat for the long-legged and Yuma myotis), therefore large snags that are potential roost sites will not be removed unless there is a safety issue with the tree (i.e. hazard tree adjacent to campground or roadside). Efforts to reduce any loss of snags in the future would include emphasizing green-tree replacements 100 ft or greater from roads or developed areas. Any negative effects as a result of lost roosting snags would be minimized with these efforts.

The only known cave within the project area would be protected from disturbance and micro-environmental changes (see Mitigation #12). If any new caves are discovered in the project area, they would be protected by Mitigation #12 as well.

Alternatives 1, 2 and 3

Cumulative Effects

No ongoing, planned, or reasonably foreseeable treatments are occurring or will occur in the vicinity of the known cave entrance. No cumulative effects are anticipated.

Wildlife Habitats

Connectivity

Existing Condition

Connective corridors were established within portions of the project area under past timber sales (Prairie Dog, Gem, Edge, Woof, and Emerald timber sales) and additional corridors have been established with the Long Prairie Mistletoe Reduction Project. Much of the connectivity within the lodgepole pine exists in unharvested stringers between old units that were harvested in the mid 1980s as a result of the mountain pine beetle infestation. The majority of the project area consists of early and mid-structural stage lodgepole pine with inclusions of ponderosa pine in various structural stages.

Alternative 1

Direct and Indirect Effects

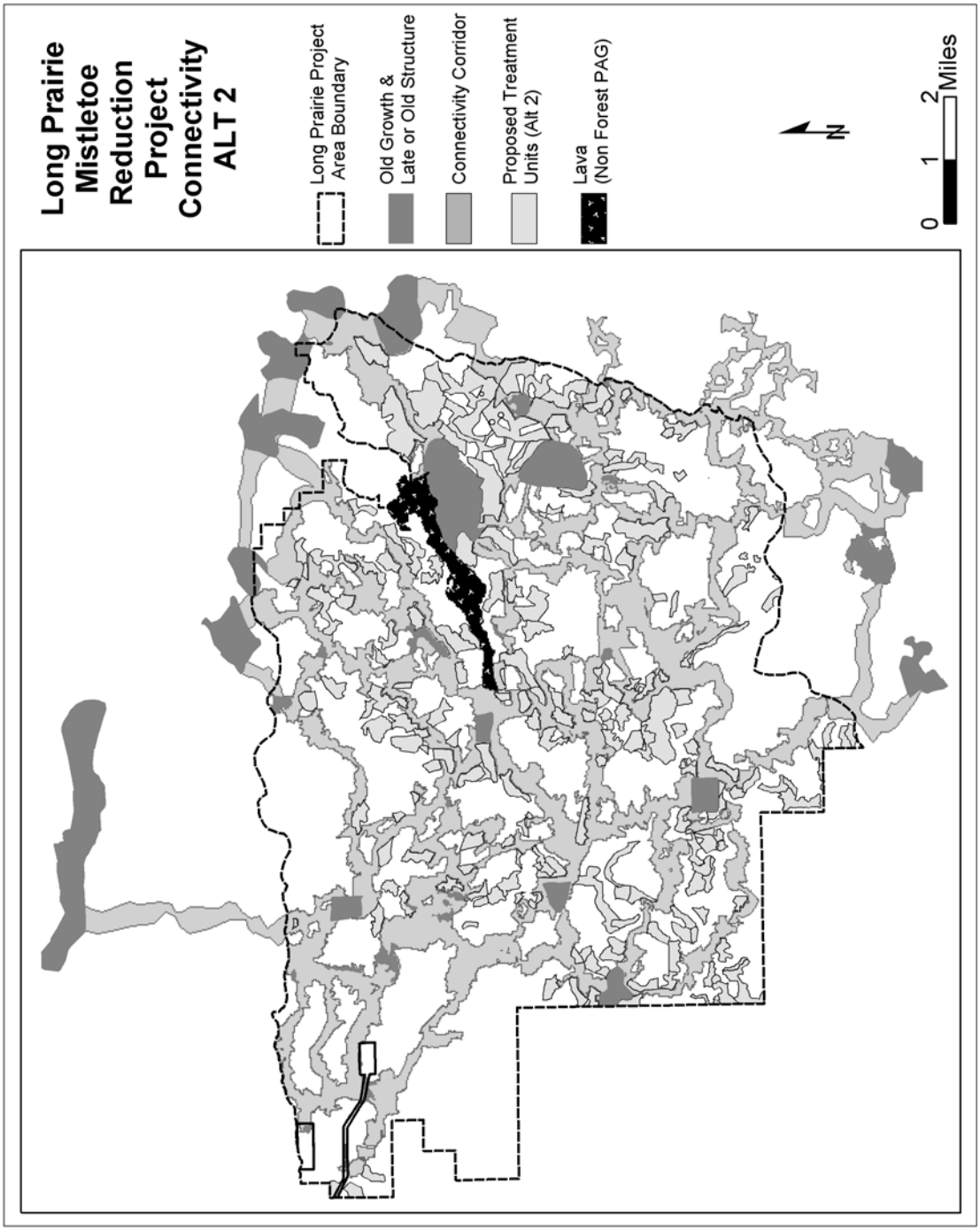
With the No Action alternative, connectivity would remain unchanged in the short-term. Road densities would remain unchanged. Stand density would be unaltered in the short-term. Existing overstory and understory tree densities would remain in the current condition. Existing overstory trees would be available for natural snag and down log recruitment in the long-term. Ramifications include potential reductions in stand growth due to high degrees of mistletoe infestation in some connectivity stands. In areas that are highly fragmented and where overstory tree density is low the amount of mistletoe could negatively impact the quality of connectivity in the long-term.

Alternatives 2 and 3

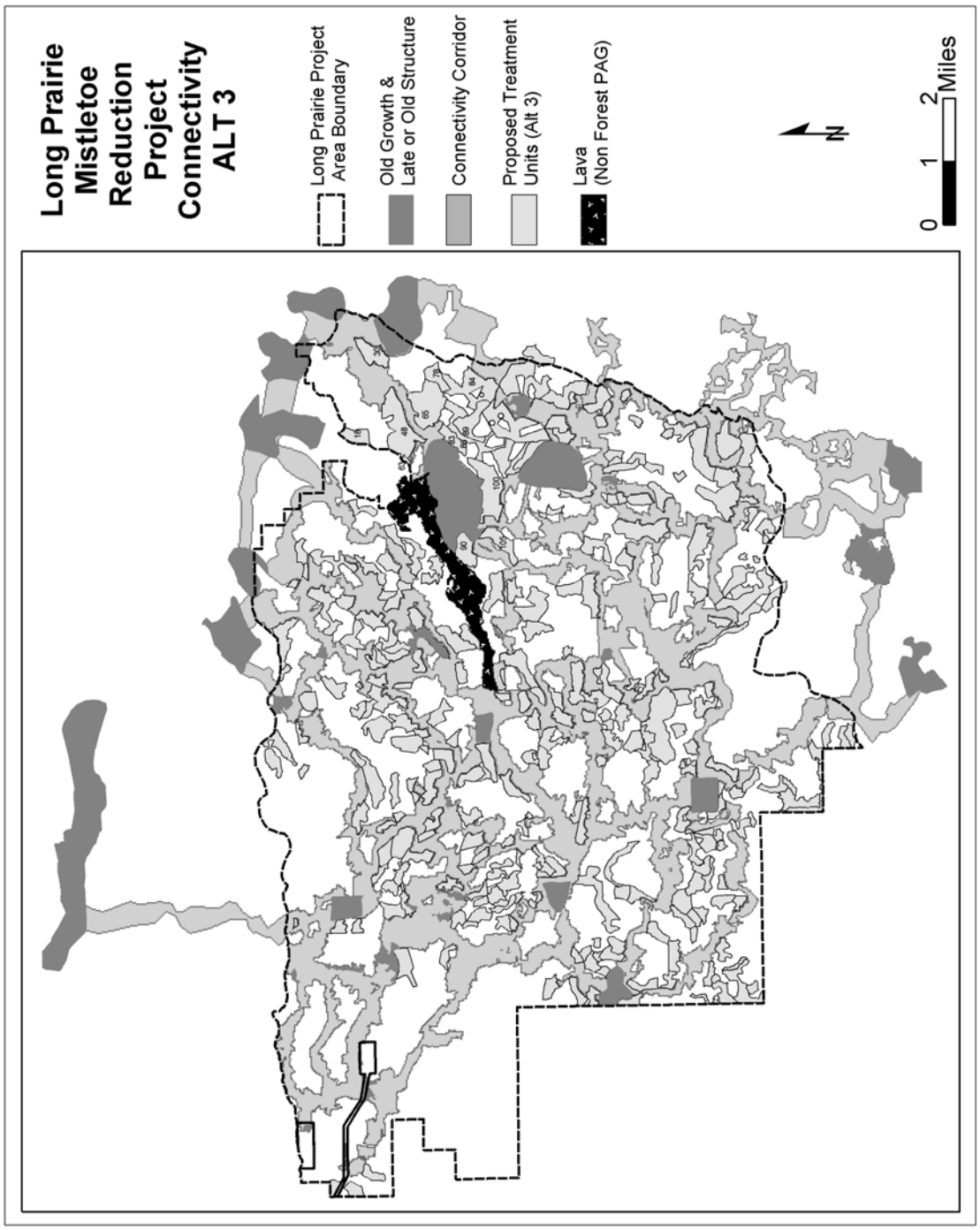
Direct and Indirect Effects

In Alternative 2, one proposed unit (Unit 121) overlaps a connectivity corridor. In Alternative 3, three proposed units overlap connectivity corridors (Units 49, 115, 121). Proposed treatments in unit 49 would not affect existing connectivity. A green tree replacement clump within the unit overlaps the connectivity corridor. No removal of overstory would occur in the connectivity corridor. Within unit 115, the proposed treatment is to fell/girdle/prune infected overstory trees. This treatment would not reduce existing canopy closure throughout the stand, but may create small canopy gaps. Greatest potential for connectivity to be disrupted would be in unit 121. Proposed treatments could reduce canopy cover below the top one-third of the site potential.

No other proposed timber harvest activities under either action alternative would occur in stands that meet the definition of connective habitat as described under the Eastside Screens (Maps 11 and 12). Understories in all units proposed for treatment range from low to high stocking. No removal of understory would occur under any alternative. Access of harvest equipment into treatment units would create short-term linear gaps in the understory. Use of designated skid trails will reduce the potential for degradation of existing connectivity provided by understory vegetation. Although the effectiveness of the connectivity habitat would be impacted where the proposed units overlap a corridor, implementation of any action alternative is expected to have no negative impacts to connectivity function on the landscape.



Map 11. Connectivity Corridors and Alternative 2 Units, Long Prairie Mistletoe Reduction Project.



Map 12. Connectivity Corridors and Alternative 3 Units, Long Prairie Mistletoe Reduction Project.

Cumulative Effects

Stands providing connectivity will continue to be apparent across the landscape as the result of past, continuing, and future timber harvest. These connections will be relied upon to provide the dispersal habitat, and extensions of late- and old-successional (LOS) habitat for those wildlife species that depend on LOS habitat.

Compliance with Forest Plan Direction (Alternatives 1, 2, and 3)

The eastside screens require that timber sale projects maintain connectivity and reduce fragmentation of LOS stands and maintain or enhance the current level of connectivity between LOS stands and between all Forest Plan designated "old growth/MR" habitats. None of the proposed alternatives would reduce the existing connectivity in the project area.

Late/Old Structural Habitat and Designated Old-Growth

Existing Condition

Exact amount and distribution of late and old structure (LOS) existing prior to European settlement is unknown. Analysis of existing conditions shows that LOS (multi-story with large trees and single-story with large trees) acres are below levels estimated to have existed historically in ponderosa pine and mixed conifer vegetation types. The existing condition of LOS (multi-story with large trees and single-story with large trees) in the project area is described in Table 4.

Alternative 1

Direct and Indirect Effects

There would be no direct effects to existing LOS or old growth. In the absence of mistletoe reduction treatments, mistletoe infection is likely to spread from the infected overstory to the understory in the project area. The potential for understory stands to develop into LOS or old growth may be diminished.

Alternatives 2 and 3

Direct and Indirect Effects

No treatments would occur in stands designated as old-growth (MA-15, LRMP), or in LOS stands. All alternatives would maintain existing acres of multi-story with large trees and single-story with large trees (Table 4). Treatments proposed in both alternatives would increase the opportunity for the understories in treatment units to develop into LOS habitat.

Alternatives1, 2 and 3

Cumulative Effects

Previous disturbances within and adjacent to the project area consist of wildfire, insect and disease outbreak, and forest management activities (see Appendix C). Other projects occurring or scheduled to occur within the project area, including Miscellaneous Post sale and Ponderosa Pine Release projects, would not impact existing LOS stands. Potential cumulative impacts due to activities on private land are negligible due to the lack of LOS remaining on private land.

Snags, Green Tree Replacements and Coarse Woody Material

Snags

According to the Eastside Screens Direction, all sale activities (including intermediate and regeneration harvest in both even-age and uneven-age systems and salvage) will maintain snag and green tree replacements of ≥21"dbh, or whatever is representative of the stand if overstory is smaller, at 100% potential population levels of primary cavity excavators. To quantify numbers and size of snags at the 100% potential population levels the Deschutes Wildlife Tree and Log Implementation Strategy (DWTL; USDA 1994b), and the DecAID Advisor (Marcot, et. al. 2003) were used (Table 10).

The DecAID Advisor is an Internet-based summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. The information presented on wildlife species use of snags and down wood is based entirely on scientific field research and does not rely on modeling wildlife populations. As such, it offers a way of estimating or evaluating levels of dead wood habitat that provide for a wide array of species and ecological processes. DecAID uses tolerance levels (30%, 50%, and 80%) to estimate the percent of all individuals in a population that use habitats that contain snags or down wood within a specified range of values. Roughly translated, an 80% tolerance level means that 80% of a wildlife species dependent on snags or logs will use an area containing these levels. The DecAID Advisor also provides coarse woody material (CWM) recommendations in terms of size and percent of area covered by downed material.

Using Region 6 recommendations for use of this tool, the following steps were followed to determine the desired levels of snags and logs. First, general plant associations were selected as the delineated analysis units. This resulted in two types: Ponderosa Pine/Douglas-fir and Lodgepole Pine (see Table 10). Secondly, a structural stage was determined. With all proposed activities to occur within previously regeneration-harvested units, the applicable structural stage was open canopy with sapling/poles[1]. The 50% tolerance level was determined based on the facts that the project area is largely made up of ponderosa pine and lodgepole pine plant associations, an area with a more frequent fire return interval, and relatively flat topography. Because of the lack of information within the lodgepole pine habitat type in DecAID and the lack of habitat breakdown in the existing district information, it is appropriate to display the different management directives and sources of information together. As displayed in Table 10, the directives are similar in the desired management levels within the ponderosa pine/Douglas-fir habitat type and comparable in the lodgepole pine habitat.

[1] Reflects the following structural stages from Table 4: Stand initiation; Stem exclusion, closed canopy; understory reinitiation; and multi-story without large trees.

Table 10. Desired Snag Density by Habitat Type and Document Source.

Habitat Type[a]	Existing[b] (# snags/acre)		DWTL (# snags/acre)[c]		DecAID (# snags/acre) 50% tolerance level	
	≥10-11.9"dbh	≥12" dbh	≥15-19.9" dbh	≥20" dbh	≥10-19.9"dbh	≥20"dbh
Ponderosa Pine/Douglas-fir **Open canopy** **Sapling/Pole**	**1.6** **(0.5 within units)**	**1.2**	**2.11**	**0.14**	**1.7**	**3.0**
Lodgepole			**≥10"dbh** **1.21**	**≥12"dbh** **0.59**	**Info. not available***	**Info. not available***

[a] In order to compare and contrast management levels, the Habitat Types in bold reflect the DecAID types; and this category include the DWTL ponderosa pine and mixed conifer habitat types.

[b] Existing snag densities were not broken down in habitat types.

[c] For the DWTL and DecAID columns, snags/acre reflect the desired densities.

*** Rose et.al. 2001, suggests upwards of 8.5 snags per acre (8 snags >10: and 0.5 snags >19.7 per acre) in the early to mid structure lodgepole type. These figures however, have not undergone the same scrutiny in regards to natural disturbances and localized influences as the other habitat types in the DecAID advisor.**

Existing Condition

The project area contains habitat for woodpeckers dependent on cavities for nesting. No surveys have been completed to date for cavity dependent species, and there are no known nest sites that occur within the project area. The following species of primary cavity excavators and secondary cavity nesters are known to inhabit or potentially inhabit the project area: white-headed woodpecker, black-backed woodpecker, Northern flicker, Lewis' woodpecker, and Pygmy nuthatch. Table 11 summarizes the existing condition of snags within the project area. Data was recorded in 1997 and 2002 within Current Vegetation Survey (CVS) plots distributed throughout the project area.

Existing habitat conditions within proposed treatment units consist of widely spaced overstory trees and infrequent, scattered small-diameter snags. Stands without large-diameter snags are likely to be unsuitable for white-headed woodpecker, Lewis' woodpecker, and Williamson's sapsucker. A large portion of treatment units consists of lodgepole pine, where a low likelihood of nesting exists for pygmy nuthatch and northern flicker (Marshall et al. 2003). Black-backed woodpeckers are more likely to nest in areas of burned forest, insect outbreaks, or more dense mature forest and over mature stands (Goggans et al. 1987).

Table 11. Existing Snag Densities within the Long Prairie Project Area.

Habitat Condition	Avg. Snags per Acre (TPA) 8-10" (dbh)	Avg. Snags per Acre (TPA) 10-12"(dbh)	Avg. Snags per Acre (TPA) >12" dbh	Avg. Snags per Acre (TPA) 15-20" (dbh)	Avg. Snags per Acre >20" (TPA)	Avg. Snags Per acre >8" dbh
Treatment Units	1.4	0.3	0.2	---	---	1.9
Project Area Average	5.0	1.6	0.7	0.2	0.3	7.8

Existing snag densities within proposed treatment units are at or near densities recommended by the Deschutes National Forest Tree and Log Implementation Strategy (1994) and what could be expected under DecAID, but diameters within these stands are smaller than those recommended by both sources. Existing snag densities within proposed treatment units are unlikely supporting 100% maximum population potential (MPP) of endemic woodpecker populations.

The project area as a whole is supporting higher snag densities than proposed treatment units. As seen in Table 13, the current average levels in each of the habitat types are likely close to the desired densities for smaller snags, but below the levels for larger snags. Most of these snags occur in the 8-10 inches dbh category, which are not expected to support nesting by all species.

Alternative 1

As a result of the no action alternative, snag levels in the project area are expected to remain fairly constant, as existing snags fall and new ones are recruited. For cavity-nesting species that prefer a more forested condition (along with a snag component), the regeneration areas would remain low quality habitat. Further mistletoe infestation may impede higher quality habitat for snag-dependant species from developing.

Alternative 2

Direct and Indirect Effects

No removal of existing snags is proposed under Alternative 2. Snag removal for operator safety during logging operations may occur, but is expected to be rare due to an overall lack of hazardous snags as well operator use of mechanized equipment. Therefore, snag densities shown within Table 13 for treatment units are not expected to decrease under the action alternatives.

Given the low potential for nesting use in stands proposed for treatment, incidental removal of snags for safety reasons may impact individual cavity nesters, but is not likely to impact local populations.

Alternative 3

Direct and Indirect Effects

Similar to Alternative 2, this alternative proposes no snag removal. Alternative 3 proposes girdling mistletoe-infected trees over approximately 3,590 acres; girdled trees

would contribute to the existing snag levels, and may increase habitat for cavity nesting species.

Alternatives 2 and 3

Cumulative Effects

The cumulative effects of proposed treatments, past activities, and future management activities would maintain habitat gaps already existing on the landscape, and prolong the development of new snags sooner by removing mistletoe-infected trees that would become snags in the short-term. A beneficial cumulative effect is that the action alternatives have a higher probability of developing mature stands with large trees in the long-term due to the reduction of mistletoe.

Green Tree Replacements

Green tree replacements (GTRs) are trees that are retained post treatment to ensure that there are trees to recruit as future snags and down logs. These trees provide future habitat for primary cavity nesters, and eventually function as coarse wood for species relying on this habitat component. In ponderosa pine stands, retention of GTRs maintains a large tree component and allows for an accelerated return to a multi-strata canopy condition. In lodgepole pine stands, maintenance of overstory trees to facilitate multi-strata conditions for more than several decades may not be realistic, but these trees still function as future snags.

Green tree replacements do not need to be present over every acre in a forested ecosystem. A mosaic distribution across the landscape maintaining ecological function is the desired condition. Desired conditions within the DWTL Strategy are based on assumptions that DWTL deficits or surpluses, whether natural or related to past management activities, will continue to be part of the landscape; treatment units will be designed to meet Strategy objectives each entry or treatment; and that some treatment units will not provide GTRs due to preference given to other issues, such as mistletoe reduction. Standards and guides within Eastside Screens require that in regeneration and intermediate harvest types, in both even age and uneven aged system, salvage must maintain GTRs of greater than 21 inches dbh, or the representative dbh of the overstory layer if less than 21 inches, at 100 percent Maximum Population Potential (MPP) of primary cavity excavators. The DWTL indicates the following objective: assuming that the mean residual stand in these lodgepole pine regeneration units is approximately 1" dbh, the number of GTRs >10" dbh is 27.3 trees per acre.

Existing Condition

The majority of the project area, including some of the proposed units that are old regeneration units, meets recommended level of GTRs. Some early structure stage stands are lacking the desired number of GTRs due to fires, insect outbreaks and past management.

Alternative 1

Direct and Indirect Effects

The No Action alternative would retain GTRs at current levels (Tables 1 and 12) within the combined areas proposed for treatment in Alternatives 2 and 3. There would be no

change in the existing distribution of GTRs. On the average, green tree replacements in these areas average 21 trees per acre, or approximately 80% MPP.

Mistletoe would continue to spread from overstory to understory trees. As infection levels increase in the understory, there would be reduced potential for understory trees to grow to sizes suitable for cavity nesters.

Alternative 2

Direct and Indirect Effects

Overstory trees to be removed and those to be retained to serve as green tree replacements are detailed in Appendix 1 and summarized in Table 2. The majority of treatment areas have an overstory dominated by lodgepole pine. In these areas, all but 3 lodgepole pine overstory trees per acre would be harvested. Ponderosa pine or white fir overstory trees, if present, would be retained. Following treatment approximately 3 to 6 green tree replacements would remain (Table 1). Within Alternative 2 treatment areas, green tree replacements would be approximately 10-20% MPP. When considering the areas that would be treated with this alternative (8,180 acres) and those identified as having mistletoe but not included for treatment (3,450 acres), a weighted average of 11 overstory trees per acre would be retained (Tables 1 and 12). In this combined area (11,630 acres), a relatively low number of green tree replacements (3-6 trees per acre) would be retained on approximately 70 percent of the area.

Trees in designated green tree replacement clumps would supplement green tree replacements retained in treatment areas. In the green tree replacement areas, there are an average of approximately 65 trees per acre greater than or equal to 8 inches dbh (Silviculture Report). When considering green tree replacements retained within treatment areas and those present in retention clumps, an average of 32 trees per acre (greater than or equal to 8 inches dbh) would remain to serve as green tree replacements (Tables 1 and 12). This would exceed 100% MPP of green tree replacements. Trees presently 10 inches dbh or larger (Table 12) are large enough to provide suitable cavity nester habitat. Trees 8 to 10 inches dbh would grow into suitable cavity nester habitat as their diameters increase.

Alternative 3

Direct and Indirect Effects

Overstory trees to be removed and those to be retained to serve as green tree replacements are detailed in Appendix 1 and summarized in Table 2. Alternative 3 proposes treatments similar to those proposed in Alternative 2 on approximately 5,300 acres (Table 2). To retain more green tree replacements within treatment units, Alternative 3 proposes treatments on approximately 5,370 acres that would retain trees without dwarf mistletoe (Tables 1 and 2). On approximately 3,590 of these acres, mistletoe infected overstory trees would be felled, girdled, or pruned (Table 2). With this treatment, it's estimated approximately 19 overstory trees per acre would be retained. Considering all treatment areas (11,630 acres), a weighted average of 11 overstory trees per acre would be retained (Tables 1 and 12). While this average is the same as Alternative 2, less of the treatment area would have relatively low numbers of green tree replacements. Approximately 47 percent of the area (Table 2), in contrast to 30% with

Alternative 2, would retain a relatively high number of green tree replacements (greater than 17 trees per acre).

Similar to Alternative 2, trees in green tree replacement clumps would supplement green tree replacements within treatment areas. Collectively in these areas, an average of 31 trees per acre (greater than or equal to 8 inches dbh) would remain to serve as green tree replacements (Tables 1 and 12). This would exceed 100% MPP of green tree replacements.

Table 12. Total Green Tree Replacements (GTRs), as represented by trees per acre (tpa) by alternative.

Green Tree Replacement Size and Landscape Scale	Trees per Acre (Weighted Average)		
	Alternative 1	Alternative 2	Alternative 3
GTR ≥8 inches dbh[1]			
Harvest Unit	21	11	11
Harvest Unit and Adjacent Green Tree Replacement Clumps	21[2]	32	31
Project area	35	31	30
GTR ≥10 inches dbh			
Harvest Unit	9	5	5
Harvest Unit and Adjacent Green Tree Replacement Clumps	9[2]	14	13
Project area	15	14	14

[1] Assuming a minimal diameter growth rate of one-half inch per decade, green tree replacements 8" dbh would grow to 10 inches dbh within 40 years. Green tree replacement clumps are expected to be necessary for 60 to 80 years.

[2] Alternative 1 does not designate green tree replacement clumps adjacent to units. Green tree replacement estimate is for inside treatment unit.

Alternatives 1, 2, and 3

Cumulative Effects

Portions of the Gem Timber Sale (Appendix 3) overlap areas proposed to serve as green tree replacement clumps for Long Prairie Alternatives 2 and 3. With Alternative 2, approximately 25 acres of GTR clumps overlap with Gem. With Alternative 3, there is approximately 60 acres overlap. Alternative 3 GTR clumps affected by Gem activities are adjacent to Long Prairie units proposed for felling/girdling/pruning. Following activities associated with the Gem Timber Sale, these areas will no longer provide suitable numbers of green tree replacements. Acres of suitable clumps in Alternative 2 would be reduced by less than 1 percent. Suitable clumps would be reduced by 1 percent in Alternative 3. These changes are small enough that there would be no change in the average number of green tree replacements displayed in Table 12. Other foreseeable future actions (Appendix 3) would not affect green tree replacement clumps.

It would be more than 60 years before the sapling/poles within the units function as snag habitat. This would prolong the gap in time before snag and closed canopy habitat returns to the area. In the meantime, habitat would be limited to the GTR clumps, LOS stands, and corridors to maintain movement and viability of the species that depend on such habitat.

Conversely removal of mistletoe trees and the regrowth of the stand would reduce the habitat of the species that capitalize on such habitat (red-tailed hawks, great horned owls, barred owls, long-eared owls). Most of these species, however, can also utilize more closed canopy forests, and it is acknowledged that this project will not totally eliminate mistletoe from the stand.

Coarse Woody Material

Existing Condition

The project area contains a wide range of existing coarse woody material (CWM). Stands proposed for treatment under the action alternatives are expected to contain low levels of CWM due to past activities.

Alternative 1

No impact to CWM is expected under the No Action alternative.

Alternatives 2 and 3

Direct and Indirect Effects

Neither action alternative proposes to remove existing down logs. Post-treatment coarse wood density and distribution is expected to remain similar to the No Action alternative in the short-term. Long-term impacts of the action alternatives include removing existing green trees that would one day be recruited into the down log component. Treatment units under alternative 2 would recruit 3 trees per acre within treatment units as those are retained post-treatment. Under alternative 3, down logs would be recruited in clumps within and adjacent to treatment units, and to a lesser degree from trees retained in more scattered distribution. In addition, girdling and felling trees would contribute to short-term coarse wood amounts.

Cumulative Effects

Gaps in coarse wood recruitment within treatment units outside untreated clumps are likely to persist for 40-80 years under all alternatives. Additional stem removal under the action alternatives would cause reduced levels of CWM recruitment in relation to the no action alternative. Untreated areas as well as green tree retention clumps are expected to provide long-term sources of coarse wood under the action alternatives.

Proposed, Threatened, Endangered, Sensitive Plants __

Existing Condition

The project area has suitable habitat for *Botrychium pumicola* (BOPU). BOPU grows in pumice frost pockets and openings within the forest canopy. Plant surveys in 1990, 1991 & 1992 located 10 populations of BOPU scattered throughout this area of the District. The Long Prairie project will take place in units that have been planted after harvest, or have regenerated naturally. It is unlikely that BOPU would grow where there has been much ground disturbance and there is a closed tree canopy. No further plant survey was considered necessary for this project.

Alternative 1

Direct and Indirect Effects

There are no expected direct or indirect effects in the absence of treatments within the project area.

Cumulative Effects

BOPU grows in pumice frost pockets and openings within the forest canopy. Non-treatment of dwarf mistletoe may result in more trees dying. This may affect BOPU should trees die and fall into the openings where it grows. More dead trees would likely be susceptible to wildfire. This may affect BOPU positively in that the canopy would be opened up, although the effects of wildfire on BOPU have not yet been studied.

Alternatives 2 and 3

Direct and Indirect Effects

No direct or indirect effects are expected from the implementation of either alternative. No known BOPU sites are within proposed treatment units. Known BOPU sites outside of treatment units would be protected from any logging activities. Proposed treatment units are unlikely to have suitable habitat conditions for BOPU.

Cumulative Effects

No cumulative effects are anticipated.

Findings

The analysis of effects on species viability found the following:

The project may impact individuals or habitat of *Botrychium pumicola*, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Noxious Weeds/Exotic Species

Forest Service Manual (FSM) direction requires that Noxious Weed Risk Assessments be prepared for all projects involving ground-disturbing activities. For projects that have a moderate to high risk of introducing or spreading noxious weeds, Forest Service policy requires that decision documents must identify noxious weed control measures that will be undertaken during project implementation (FSM 2081.03, 29 November 1995).

Project practices must be consistent with direction from the February 3, 1999 Executive Order on Invasive Species (Executive Order #13112), which requires Federal agencies to use relevant programs and authorities to prevent the introduction and spread of invasive species (see Noxious Weed Risk Assessment for Long Prairie Mistletoe Project and Appendix B therein, project file).

Aggressive non-native plants, or noxious weeds, can invade project areas and cause long-lasting management problems by displacing native plant communities, increasing fire hazards, reducing the quality of recreation experiences, poisoning livestock, and

replacing wildlife forage. By simplifying complex plant communities, weeds reduce biological diversity and threaten rare habitats.

In addition to noxious weeds, which are designated by the State of Oregon, there is a group of non-native plants that are also aggressive but are not officially termed "noxious;" these are also included in the weed assessment (see Table 13 and Noxious Weed Risk Assessment for Long Prairie Mistletoe Project in the project file).

Table 13. Deschutes National Forest noxious weed list, with noxious weeds of concern in the Long Prairie Mistletoe Reduction project file identified.

Scientific Name	Common Name	Presence on the Forest	Of concern in the Project Area
Agropyron repens	Quackgrass	Documented	
Cardaria (Lepidum) draba	Whitetop	Potential	
Carduus nutans	Musk thistle	Potential	
Carduus pycnocephalus	Italian thistle	Potential	
Centaurea diffusa	Diffuse knapweed	Documented	**X**
Centaurea maculosa	Spotted knapweed	Documented	**X**
Centaurea pratensis	Meadow knapweed	Potential	
Centaurea repens	Russian knapweed	Potential	
Centaurea solstitialis	Yellow starthistle	Potential	
Centaurea virgata ssp. squarrosa	Squarrose knapweed	Potential	
Cirsium arvense	Canada thistle	Documented	
Cirsium vulgare	Bull thistle	Documented	**X**
Conium maculatum	Poison hemlock	Potential	
Cynoglossum officinale	Common houndstongue	Documented	
Cytisus scoparius	Scotch broom	Documented	
Euphorbia esula	Leafy spurge	Documented	
Hypericum perforatum	St. Johswort	Documented	
Isatis tinctoria	Dyer's woad	Documented	
Kochia scoparia	Kochia	Potential	
Linaria dalmatica	Dalmation toadflax	Documented	**X**
Linaria vulgaris	Butter and eggs	Documented	
Lythrum salicaria	Purple loosestrife	Potential	
Onopordum acanthium	Scotch thistle	Documented	
Salvia aethiopis	Mediterranean sage	Potential	
Senecio jacobaea	Tansy ragwort	Documented	
Taeniatherum caput-medusae	Medusahead	Documented	

Existing Condition

A noxious weed risk assessment was prepared for this project. Currently, no noxious weeds are known to exist within the project area. Noxious weeds are present at a water site located outside the project area along the Little Deschutes River (by County Road 43). This site has been used in the past as a water source. Actions are ongoing to suppress or eradicate noxious weeds located at this site.

Alternative 1

Implementation of Alternative 1 has been determined to have a **low** level of risk associated with the introduction of noxious weeds due to use of the analysis area by recreationists and Forest Service personnel.

Alternatives 2 and 3

Prevention of the introduction of noxious weed invasion is required by law (Executive Order #13112). To address noxious weed invasion issues, the USDA Forest Service has compiled a "Guide to Noxious Weed Prevention Practices" (see Noxious Weed Risk Assessment for Long Prairie Mistletoe Project and Appendix C therein, project file). The following is a summary of the Required Prevention Measures and Optional Prevention Measures that apply to the Long Prairie Mistletoe Reduction Project.

1. District contract administrators have been trained in noxious weed identification and have noxious weed information available to give to contractors.
2. Old landings and skid trails will be reused for the Long Prairie project.
3. For timber harvest operations, timber sale purchaser road maintenance and road decommissioning, use standard timber sales contract provisions such as WO-C/CT 6.36 to ensure appropriate equipment cleaning.
4. Some logging over snow may occur.
5. No new roads are planned. Old roads to the units are to be reopened.
6. Major roads within the Long Prairie project area (Road 22, 2121, 2210, 2215, 2220, 2222, 2225, and 9736) were inspected for the presence of noxious weeds during the 2003 field season. No noxious weeds were found.
7. Skid trails and landings are to be monitored for noxious weed invasions for 2 years following completion of the Long Prairie project. Any new infestations will be inventoried and treated as appropriate.

With the above prevention measures and Mitigation #7, implementation of Alternatives 2 or 3 has been determined to have a **moderate** level of risk associated with the introduction of noxious weeds.

Soil Resource

Effects to the Soil Resource are summarized from the Soil Scientist's Report, which can be found in the project file.

Introduction

The long-term sustainability of forest ecosystems depends on the productivity and hydrologic functioning of soils. Ground-disturbing management activities directly affect soil properties, which may adversely change the natural capability of soils and their potential responses to use and management. A detrimental soil condition often occurs where heavy equipment or logs displace soil surface layers or reduce soil porosity through compaction. Indirect effects from these impacts include increased runoff and accelerated soil erosion. Detrimental disturbances reduce the soils ability to supply nutrients, moisture, and air that support soil microorganisms and the growth of

vegetation. The biological productivity of soils relates to the amount of surface organic matter and coarse woody debris retained or removed from affected sites.

Scope of the Analysis

The soil resource may be directly, indirectly, and cumulatively affected within each of the activity areas proposed within the project area. An activity area is defined as "the total area of ground impacted activity, and is a feasible unit for sampling and evaluating" (FSM 2520 and Forest Plan, page 4-71). For this project proposal, activity area boundaries are considered to be the smallest identified area where the potential effects of different management practices would occur. Thus, the discussion of soil effects and soil quality standards will be focused on the units proposed for silvicultural treatments. The activity areas range from approximately 3 acres to 242 acres in size.

Quantitative analyses and professional judgment were used to evaluate the issue measures by comparing existing conditions to the anticipated conditions which would result from implementing the action alternatives. The temporal scope of the analysis is defined as short-term effects being changes to soil properties that would generally revert to pre-existing conditions within 5 years or less, and long-term effects as those that would substantially remain for 5 years or longer.

Affected Environment

The landscape is generally characterized by gentle to uneven lava plains with cinder cones and buttes associated with the Newberry Crater complex. Ash deposits from Mount Mazama (Crater Lake) and Newberry Crater volcanoes have covered most of the planning area, except for a few barren lava flows of minor extent. Most of the water yielded from these lands is delivered to streams as deep seepage and subsurface flows that emerge at lower elevations. There are no perennial or intermittent stream channels within the project area. Ephemeral drainage channels flow only during high precipitation events.

Approximately 80 percent of the planning area is composed of gentle to uneven lava plains and ridges that rise above gently-sloping outwash plains and flats that comprise about 10 percent of the area. Slopes generally range from 0 to 30 percent with the exception of a few cinder cones and steeper side-slopes (30 to 70 percent) on ridges and buttes that comprise less than 5 percent of the planning area.

Except for occasional areas of exposed bedrock associated with some of the youngest lava flows, the majority of the planning area (approximately 95 percent) has been covered by a moderately thick layer of volcanic ash deposits. The volcanic ash-influenced soil generally varies from 20 to 40 inches thick and consists mostly of sand-sized soil particles. Previously developed soils are buried at depths that range from approximately 15 to 60 inches. Bedrock consists dominantly of basalt and andesite lava.

Dominant soils are moderately deep (20 to 40 inches) to deep with loamy-sand textures that readily drain excess moisture over much of the project area. The underlying residual soils and bedrock materials have a moderate capacity to store water. These soil types

generally have moderate productivity potential for the growth of vegetation. Less productive soils are commonly found on south and west aspects and on convex slope positions such as basalt ridges and side-slopes of buttes and cinder cones. Approximately 10 percent of the project area is comprised of landtypes that contain shallow soils (less than 20 inches) and areas of exposed bedrock that generally produce surface runoff only during high intensity storms. The more productive soils are commonly found on north and east aspects, and on concave slope positions such as toe slopes, swales and depressions. The deep soils (greater than 40 inches in depth) in these landscape positions commonly reflect areas of dense vegetation.

Soils derived from Mazama ash tend to be non-cohesive (loose) and they have very little structural development due to the young geologic age of the volcanic parent materials. These ash-influenced soils have naturally low bulk densities and low compaction potential. However, mechanical disturbances can still reduce soil porosity to levels that limit vegetative growth, especially where there is a lack of woody debris and surface organic matter to help cushion the weight distribution of ground-based equipment. Due to the absence of rock fragments on the surface and within soil profiles, these soils are well suited for tillage treatments (subsoiling) that loosen compacted soil layers and improve the soils ability to supply nutrients, moisture, and air that support vegetative growth and biotic habitat for soil organisms. The sandy-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.

Sensitive Soil Types

Criteria for identifying sensitive soils to management are listed in the Deschutes LRMP (Appendix 14, Objective 5). Sensitive soils within the Long Prairie project area include: 1) soils on slopes greater than 30 percent, 2) soils associated with frost pockets in cold air drainages, 3) soils that occur in localized areas of rocky lava flows, and 4) soils with high or severe hazard rating for surface erosion.

Approximately 8 percent (4,410 acres) of the project area contains landtypes with localized areas of sensitive soils (Table 14). Only portions of these total landtype acres contain localized areas with sensitive soils. Sensitive soil areas that occur within proposed activity areas are discussed under the direct and indirect effects of implementing the action alternatives.

Table 14. Landtype acres that contain localized areas of Sensitive Soils within the Long Prairie project area (Soil Resource Inventory (SRI), Deschutes National Forest, 1976) .

SRI Map Unit	Geomorphology (Representative landforms)	Management Concern**	Landtype Acres	Percent of Planning Area
1, 11	Rough, uneven lava flows	3	1,013	1.8%
7, 15	Depressions or Flats	2	1,841	3.3%
18, 84, 89	Steep slopes of buttes and lava ridges	1, 4	241	0.4%
81, 82, 83	Cinder cones	1	1,315	2.3%
TOTAL			4,410	7.9%

****Management Concern**

1) On slopes greater than 30 percent, loose sandy soils are susceptible to soil displacement.
2) Very low productivity due to frost heaving, low fertility, and temperature extremes.
3) Sensitive soils with variable depths in pockets and cracks of rocky, uneven lava flows.
4) Sensitive soils with a high or severe hazard for surface erosion.

Existing Condition of the Soil Resource

Detrimental Soil Disturbance

There is currently little or no evidence of detrimental soil conditions from natural disturbance events within the Long Prairie project area. Enough time has passed since the occurrence of past wildfire events that existing vegetation and forest litter are providing adequate sources of ground cover to protect mineral soil from water and wind erosion. There are no natural or management-related landslides within the planning area.

The primary sources of detrimental soil conditions from past management are associated with existing roads and ground-based logging facilities which were used for timber management activities between 1974 and 2001. Although ground-based railroad logging was used to harvest large-diameter ponderosa pine in portions of the project area during the 1920's and 1930's, it is expected that natural processes have restored soil quality over the past 70 to 80 years. Visual evidence of old logging facilities is very difficult to observe due to the abundance of ground cover vegetation and forest litter. Based on more recent harvest history, various silvicultural prescriptions have occurred over the past 30 years. Temporary roads, log landings, and primary skid trails were constructed and used to access individual harvest of past timber sales. 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 (Deschutes N.F., Soil Monitoring Reports; Page-Dumroese, 1993; Geist, 1989; Powers, 1999). Some long-term adverse effects to soil productivity still exist where surface organic layers were displaced and/or multiple equipment passes caused deep compaction.

The extent of detrimentally disturbed soil is dependent on a number of variables including the types of silvicultural prescriptions, the intensity of equipment use with each entry, and the spacing distances between main skid trails. Soil monitoring results on local soils have shown that 15 to 30 percent of the unit area can be detrimentally disturbed by ground-based harvest systems depending on harvest prescriptions, the spacing of skid trails, and soil conditions at the time of harvest (Deschutes Soil Monitoring Reports, 1995, 1996, 1997, and 1999).

A combination of past harvest history, research references, and field observations was used to estimate existing soil conditions within each of the activity areas planned for this project. Varying degrees of soil compaction and displacement were observed in previously managed areas of the project area. Since multiple harvest entries have been made and approximately 40 percent of these past disturbances occurred prior to LRMP direction (1990), conservative estimates were used to predict how much surface area is currently impacted by existing roads and logging facilities.

The majority of the past treatments were regeneration harvest prescriptions that typically cause more soil disturbance than intermediate or thinning prescriptions because equipment use is more intensive throughout activity areas (Deschutes Soil Monitoring Reports 1996, 1997, and 1999). Based on field investigations of previously managed areas on similar landtypes and soils, activity areas which were managed with intermediate harvest prescriptions generally average about 23 percent detrimental soil conditions associated with existing skid trails and log landings. Past regeneration treatments (e.g., shelterwood, overstory removal) generally cause about 6 percent more detrimental soil conditions (29 percent) and commercial thinning treatments cause about 6 percent less soil impacts (17 percent) than disturbed area estimates for skid trail networks and log landings. Based on past harvest history and the proportionate extent of overlap with proposed activity areas, these percentages were used to calculate existing amounts of detrimental soil conditions within the activity areas planned for this project.

Appendix 2 displays existing and predicted amounts of detrimental soil conditions for each of the action alternatives and specific activity areas planned for mechanical vegetation treatments. The amount of disturbed soil currently committed to existing roads, primary (main) skid trails and log landings is included in the estimated percentages. The detailed information in Appendix 2 is summarized in Table 15. Existing detrimental soil conditions range from 8 to 35 percent and average 21 percent for the combined total of 240 activity areas proposed with the action alternatives.

Table 15. Summary of detrimental soil conditions within activity areas proposed for mechanical harvest.

Alternative	Number of Activity Areas	Estimated Detrimental Soil Conditions[1]		
		Percent		Acres
		Range	Average	
Alternative 1 (Existing Condition)	240[2]	8 to 35%	21%	
Alternative 2				
All units (8,180 acres)				
Existing Condition	203	8% to 35%	20%	1,575 acres
Following Harvest		11% to 42%	26%	2,120 acres
Following Restoration (Subsoiling)		11% to 31%	21%	1,734 acres
Units with >20% detrimental condition prior to harvest				
Existing Condition	88	21% to 35%	27%	
Following Harvest		25% to 42%	34%	
Following Restoration (Subsoiling)		15% to 31%	25%	
Units with <20% detrimental condition prior to harvest				
Existing Condition	115	8% to 20%	14%	
Following Harvest		11% to 27%	20%	
Following Restoration (Subsoiling)		11% to 20%	18%	
Alternative 3				
All units (7,870 acres)				
Existing Condition	196	8% to 35%	21%	1,638 acres
Following Harvest		11% to 42%	28%	2,150 acres
Following Restoration (Subsoiling)		11% to 32%	22%	1,728 acres
Units with >20% detrimental condition prior to harvest				
Existing Condition	109	21% to 35%	27%	
Following Harvest		25% to 42%	34%	
Following Restoration (Subsoiling)		15% to 32%	25%	
Units with <20% detrimental condition prior to harvest				
Existing Condition	87	8% to 20%	14%	
Following Harvest		11% to 27%	20%	
Following Restoration (Subsoiling)		11% to 20%	18%	

[1] Summarizes unit specific information found in Appendix 2.
[2] Total combined number of activity areas with mechanical harvest for Alternatives 2 and 3

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

Subsoiling treatments have rehabilitated disturbed soil on skid trails and landings in portions of 113 past harvest units. These restoration acres were deducted in the calculated estimates of existing detrimental soil conditions where the proposed activity areas overlapped with these previously managed areas. Soils committed to existing logging facilities in other activity areas will remain in a detrimental condition until reclamation activities are implemented to improve the hydrologic function and productivity on disturbed soils.

The minor extent of detrimental soil conditions from recreational activities and livestock grazing is expected to have a negligible effect on overall site productivity within the individual activity areas proposed for this project (Soil Specialist Report). Soil disturbances from these activities are generally confined to small concentration areas, and the extent of disturbed soil is relatively minor in comparison to existing roads and past logging disturbances. There are no developed campgrounds or system trails for hiking and/or OHV use that cross through any of the proposed activity areas. Impacts from dispersed recreation activities are usually found along existing roads and trails. Field observations indicate little or no evidence of dispersed campsites within the proposed activity areas. User-created trails typically occur where vegetation has been cleared on or adjacent to old skid trail networks of past harvest areas. Conservative estimates were used to account for soil disturbances from existing logging facilities (i.e., main skid trails and landings), and the extent of these impacts is likely included in the estimates of existing detrimental soil conditions (Appendix 2). The project area contains portions of four inactive sheep allotments that have been vacant for over ten years. Native vegetation has recovered in areas of past grazing use, and upland sites are currently providing adequate surface cover to meet soil resource objectives.

Coarse Woody Debris (CWD) and Surface Organic Matter

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

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. There are some older activity areas, prior to LRMP direction (1990), where management activities likely resulted in less than

desired amounts of coarse woody debris (CWD) on the ground. Although the project area contains a wide range of existing down logs and current levels 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 natural mortality, windfall, and recruitment of fallen snags over time. Annual leaf and needle fall, small diameter branches, twigs and other forest litter have increased organic matter levels for short-term nutrient cycling.

Environmental Effects

Introduction

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

The following section, Important Interactions, provides a discussion of the potential effects on soil and biological conditions from implementing the various vegetation management treatments. After this discussion, the environmental effects of each of the alternatives are presented and tracked by the issue measures used to evaluate the estimated impacts on soil productivity.

Important Interactions

The proposed management activities include mechanical harvest and hand-felling of infected trees to reduce the spread of dwarf mistletoe. Mechanically harvested trees would be whole-tree yarded using a track-mounted harvester and grapple skidders. Most of the slash generated from these activities would be machine piled and burned at the log landings. There would be no machine piling of slash in random locations of activity areas, and prescribed underburning is not being considered at this time. Unique to Alternative 3 is the proposal to prune, girdle, or hand-fell overstory trees; there would be no use of ground-based equipment in these activity areas. Most felled trees would remain on the ground to provide surface cover and source of nutrients. Existing snags and down woody materials would be retained on site. No new roads would be constructed and retained as part of the transportation system. There would be no road decommissioning (obliteration) treatments on existing classified roads.

The best information about the proposed actions (EA, Alternative Descriptions) was used in conjunction with the location of activities to analyze the potential effects on the soil resource. The types and locations of soil disturbance vary by alternative, but the nature of the effects to the soil resource is similar for project activities that use ground-based equipment to accomplish management objectives. The same types of mechanical treatments would be used on similar landtypes, but the overall extent and locations of new soil disturbance would be somewhat different for each action alternative.

Soil condition assessments for similar soils and the same types of ground-based harvest systems, research references, and personal communications with timber sale administrators were used to predict the extent of detrimental soil disturbance anticipated from mechanized harvest and yarding activities. Estimates for predicted amounts of detrimental soil conditions following project implementation account for the expected amount of volume removal, the type of logging equipment, the spacing of skid trails, and the number of log landings that would be needed to deck accumulated materials.

Mechanical harvest would likely be accomplished using a ground-based machine equipped with a felling head (harvester shear). Feller bunchers are one of the most common harvester machines used in this geographic area. It is expected that similar equipment would be used in proposed activity areas for this project. Felled trees would be whole-tree yarded to main skid trail networks and rubber-tired grapple skidders would then transport bunched trees to landings for processing and loading. Skidding equipment would be restricted to designated skid trails at all times. It is estimated that skid trails would have an average disturbed width of 12 feet and the average spacing distance between main trails would be approximately 100 feet or approximately 11 percent of the unit area (Froehlich, 1981, Garland, 1983). The Forest average for log landings is one landing (100 feet by 100 feet) for 10 acres of harvest, which equates to approximately 2 percent of the unit area. Mechanical harvesters would only be allowed to make a limited number of equipment passes on any site-specific area between skid trails or away from log landings. The slight-to-moderately compacted surface layers in these areas are not expected to qualify as a detrimental soil condition. The majority of soil impacts would be confined to heavy use areas (i.e., roads, log landings, and main skid trails) in known locations that can be reclaimed by subsoiling treatments when these facilities are no longer needed for future management.

The development and use of temporary roads, log landings, and skid trail systems are the primary sources of physical disturbance that would result in adverse changes to soil productivity. Even with careful planning and implementation of project activities, the extent of detrimental soil conditions can be expected to increase by 5 to 10 percent with each successive entry into a stand (Craigg, 2000). Although existing skid-trail networks and log landings would be used wherever possible, the creation of some new facilities will likely be necessary because not all existing logging facilities can be reutilized due to their orientation within units. Conservative estimates were used to predict how much surface area would likely be needed to accommodate the harvest and yarding of commercial material. For regeneration harvest prescriptions (e.g., Final Removal) proposed for this entry, the creation of new logging facilities would likely cause a 7 percent increase in detrimental soil conditions. Appendix 2 displays percentages of detrimental soil conditions following harvest and restoration activities for each of the action alternatives and individual activity areas planned for this project.

Most of the slash generated from harvest activities would be machine piled and burned on log landings and/or main skid trails. These post harvest activities would not cause additional soil impacts because burning would occur on previously disturbed soils that already have detrimental soil conditions. Soil restoration treatments would be

implemented to reduce the amount of detrimentally disturbed soil committed to logging facilities following these post-harvest activities.

The action alternatives also include hand treatments for reducing activity-created fuels in portions of some activity areas. The hand pile and burn method would not cause soil displacement or compaction, and burning small concentrations of logging slash does not typically result in severely burned soils. These low-to-moderate intensity burns may actually benefit site productivity through increased available nutrients in localized areas. The cumulative effects of these activities would be minor, and the extent of detrimental soil conditions is not expected to increase above existing levels in any of the activity areas proposed for these hand treatments.

Commercial harvest and whole-tree yarding can affect soil productivity through the removal of nutrients in the form of tree boles, limbs and branches. Although these forest practices remove potential sources of future CWD, ground-based harvest activities also recruit CWD to the forest floor through breakage of limbs and tops and toppling of some trees during felling and skidding operations. This would accelerate the accumulation of woody debris and where these materials may be currently deficient. These organic materials also provide additional soil cover that improves the soils ability to resist surface erosion.

The soil mitigation and resource protection measures are designed to avoid, minimize, or rectify potentially adverse impacts to the soil resource. These measures provide options for limiting the amount of surface area covered by logging facilities and controlling equipment operations to minimize the potential for soil impacts in random locations between main skid trails and away from log landings. The effects of only two passes by tracked machinery on any site-specific area 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. Other examples include avoiding equipment operations during periods of high soil moisture and operating equipment over frozen ground or a sufficient amount of compacted snow.

Soil restoration treatments (subsoiling) would be applied to reduce the cumulative amount of detrimentally compacted soil within some of the proposed activity areas. This would include subsoiling on temporary roads and some of the primary skid trails and log landings following post-harvest activities. Individual activity areas that would receive soil restoration treatments are identified by unit number in Mitigation Measure #6. Subsoiling treatments are designed to promote maintenance or enhancement or soil quality, and these conservation practices are consistent with LRMP interpretations of 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).

As previously described under Affected Environment, extensive areas of the project area have been covered by loose, non-cohesive ash deposits with little or no structural development. These sandy-textured materials are the inherent soil properties which are typically affected by mechanical forces that either reduce or improve soil porosity in the

compaction zone. Equipment traffic can decrease soil porosity on ash-influenced soils, but compacted sites can be mitigated by tillage with a winged subsoiler (Powers, 1999). The winged subsoiling equipment used on the Deschutes National Forest has been shown to lift and shatter compacted soil layers in greater than 90 percent of the compacted zone with one equipment pass (Craigg, 2000). Although rock fragments can limit subsoiling opportunities on some landtypes, hydraulic tripping mechanisms on this specialized equipment help reduce the amount of subsurface rock that could potentially be brought to the surface by other tillage implements. Most of the surface organic matter remains in place, and any mixing of soil and organic matter does not constitute detrimental soil displacement because these materials are not removed off site. Subsoiling treatments likely improve subsurface habitat by restoring the soils ability to supply nutrients, moisture, and air that support soil microorganisms. Since the winged subsoiler produces nearly complete loosening of compacted soil layers without causing substantial displacement, subsoiled areas on this forest are expected to reach full recovery within the short-term (less than 5 years) through natural recovery processes.

Subsoiling treatments have rehabilitated disturbed soil on previously used roads and logging facilities in portions of some activity areas. Subsoiled areas would be avoided, as much as possible, to protect established vegetation and minimize the potential for surface erosion. Depending upon orientation within activity areas, however, some of these reclaimed sites may need to be re-used to facilitate yarding activities. Since the inherent properties of these ash-influenced soils have little or no structural development, it is expected that subsequent subsoiling on previously treated sites would have similar effects as described above and the primary effects would be a reduction in existing ground-cover vegetation.

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 and compaction from equipment operations. 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 1

Direct and Indirect Effects.

Detrimental Soil Disturbance

There would be no increase in the amount of surface area with detrimental soil conditions because no additional land would be removed from production to build roads or other management facilities. Although disturbed soils would continue to recover naturally, the existing percentages of detrimental soil conditions would likely remain unchanged for an extended period of time. This alternative would defer opportunities for soil restoration treatments that reduce the extent of detrimental soil conditions and help move conditions toward a net improvement in soil quality.

Soil productivity would not change appreciably unless catastrophic wildfires cause intense heating of the forest floor that results in detrimental changes to soil properties. Severe burning may cause soils to repel water, thereby increasing surface runoff and subsequent erosion. The loss of protective ground cover also increases 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. Levels of CWD will continue to increase through natural mortality, windfall, and recruitment of fallen snags. Short-term nutrient sources will 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 wild land fires which may completely consume heavy concentrations of fuel and ground cover vegetation. 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.

Alternatives 2 and 3

Direct and Indirect Effects

Detrimental Soil Disturbance

Use of ground-based equipment to harvest overstory trees would cause cumulative increases in the amount of detrimentally disturbed soil within the proposed activity areas (Appendix 2). 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. Soil mitigation and resource protection measures would be applied to avoid or minimize the extent of new soil disturbance in random locations between main skid trails and away from log landings.

Soil restoration treatments (subsoiling) would be applied to reduce the cumulative amount of detrimentally compacted soil within specific activity areas that are expected to exceed Regional and LRMP standards and guidelines for detrimental soil conditions. Subsoiling treatments would improve the hydrologic function and productivity on disturbed soils by fracturing compacted soil layers and increasing porosity within soil profiles. Subsequently, this would contribute to increased water infiltration and enhanced vegetative root development. Subsoiled areas are expected to return to natural bulk density levels within the short-term through natural recovery processes (Deschutes Soil Monitoring, 1995).

Subsoiling treatments are expected to be highly effective in restoring detrimentally compacted soils. Dominant soils within the project area are well suited for tillage treatments due to naturally low bulk densities and the absence of rock fragments within

soil profiles. The winged subsoiling equipment used locally has been shown to lift and shatter compacted soil layers in greater than 90 percent of the compacted zone with one equipment pass (Craigg, 2000). This results in nearly complete loosening of compacted soil particles without causing substantial displacement. Subsoiled areas on this forest are expected to reach full recovery within the short-term through natural recovery processes (Deschutes Soil Monitoring Reports).

The minor extent of incidental soil disturbances from the proposed slash disposal treatments are not expected to cause measurable increases in the percentages of detrimental soil conditions within any of the activity areas.

Tables 15 and 16 summarize predicted changes in detrimental soil conditions displayed in Appendix 2. Table 15 summarizes existing and predicted amounts of detrimental soil conditions following the proposed harvest and soil restoration treatments. Table 16 summarizes by unit the net change in detrimental soil conditions from current levels.

Table 16. Summary of detrimental soil conditions following proposed harvest and soil restoration.

Net Change in Detrimental Soil Condition from Existing Condition[1]	**Alternative 2**			**Alternative 3**		
	Detrimental Soil Condition			**Detrimental Soil Condition**		
	<=20%	**>20%**	**Total**	**<=20%**	**>20%**	**Total**
Existing Condition	**115 units**	**88 units**	**203 units**	**87 units**	**109 units**	**196 units**
No change	20 units	7 units	27 units	14 units	17 units	31 units
Increase, but within 20% LRMP Standard	94 units	---	94 units	71 units	---	71 units
Decrease	11 units	71 units	82 units	14 units	80 units	94 units
Post-Project Condition	**125 units**	**78 units**	**203 units**	**99 units**	**97 units**	**196 units**

[1] Summarizes unit specific information found in Appendix 2.

Under **Alternative 2**, ground-based equipment would be used in 203 activity areas that total approximately 8,180 acres. It was concluded that 88 of these activity areas currently have detrimental soil conditions that exceed 20 percent of the unit area. It is predicted that the proposed harvest and yarding activities would result in a total increase of approximately 545 acres of additional soil impacts associated with new logging facilities. Detrimental soil conditions would remain at or below the LRMP standard within 55 of these activity areas. In the remaining 148 activity areas, it is estimated that the cumulative amount of detrimental soil conditions would exceed the 20 percent standard following ground-based logging activities. Portions of these activity areas would receive subsoiling treatments to rehabilitate approximately 386 acres of detrimentally compacted soil associated with temporary roads, log landings and primary skid trails. It is predicted that 82 of the 148 activity areas would result in a net improvement in soil quality following restoration activities (Appendix 2 and Table 16). Detrimental soil conditions within the

total number of 203 activity areas would range from 11 to 31 percent with an average of 21 percent (Table 15).

Under **Alternative 3**, ground-based equipment would be used in 196 activity areas that total approximately 7,870 acres. It was concluded that 109 of these activity areas currently have detrimental soil conditions that exceed 20 percent of the unit area. It is predicted that the proposed harvest and yarding activities would result in a total increase of approximately 512 acres of additional soil impacts associated with new logging facilities. Detrimental soil conditions would remain at or below the LRMP standard within 43 of these activity areas. In the remaining 153 activity areas, it is estimated that the cumulative amount of detrimental soil conditions would exceed the 20 percent standard following ground-based logging activities. Portions of these activity areas would receive subsoiling treatments to rehabilitate approximately 422 acres of detrimentally compacted soil associated with temporary roads, log landings and primary skid trails. It is predicted that 94 of the 153 activity areas would result in a net improvement in soil quality following restoration activities (Appendix 2 and Table 16). Detrimental soil conditions within the total number of 196 activity areas would range from 11 to 32 percent with an average of 22 percent (Table 15).

The analysis indicates that the extent of detrimental soil conditions relative to existing conditions would either: 1) remain the same, 2) increase, but remain within the LRMP standard of 20 percent, or 3) decrease levels below existing conditions (Appendix 2 and Table 16). Implementation of Alternative 2 would result in the greatest extent of detrimental soil conditions following the proposed activities, and Alternative 3 would result in the least overall increase in soil impacts due to fewer activity areas and treatment acres. Under Alternative 2, the extent of detrimental soil conditions would be the same or less than the existing condition in 54 percent of the mechanical treatment units following the proposed harvest and restoration activities. In comparison, Alternative 3 would result in 64 percent of the activity areas with detrimental soil conditions which are equal to or less than existing conditions. Consequently, both action alternatives would result in fewer activity areas with detrimental soil conditions that exceed the LRMP standard compared to existing conditions (Table 16).

The harvest and restoration treatments (subsoiling) proposed in both action alternatives are consistent with Regional policy (FSM 2520, R-6 Supplement No. 2500-98-1) and LRMP interpretations for Forest-wide standards and guidelines SL-3 and SL-4 that limit the extent of detrimental soil conditions. In activity areas where less than 20 percent detrimental impacts exist from prior activities, the cumulative amount detrimentally disturbed soil would not exceed the 20 percent limit following project implementation and restoration. In activity areas where more than 20 percent detrimental impacts exist from prior activities, the cumulative detrimental effects would not exceed conditions prior to the planned activity and some activity areas would result in a net improvement in soil quality following restoration activities. Both action alternatives balance the goal of maintaining and/or improving soil quality with the goal of maintaining established vegetation on existing logging facilities that would not be used during this entry.

Sensitive Soils

The majority of activity areas proposed for mechanical harvest do not occur on landtypes that contain sensitive soils. Only a small percentage of the acres proposed for treatment contain sensitive soils in localized areas. Total affected acres and proposed units that contain small areas of sensitive soils are displayed by action alternative and concern category in Table 14. The majority of overlap occurs on low productivity sites where the potential for successful regeneration is limited by frost heaving, low fertility and climatic factors. None of the proposed activity areas overlap landtypes that contain sensitive soils with high or severe ratings for surface erosion or potentially wet soils with seasonally high water tables.

Table 17. Summary of Activity Areas proposed for Mechanical Harvest on Landtypes with Sensitive Soils.

Management Concern	Alternative 2	Alternative 3
Slopes greater than 30 percent	**7 acres** in 5 units that total 358 acres (2% of unit acreage).	**5 acres** in 4 units that total 287 acres (2% of unit acreage).
Low productivity sites limited by frost heaving, low fertility and climatic factors	**94 acres** in 17 units that total 673 acres (14% of unit acreage).	**52 acres** in 8 units that total 636 acres (8% of unit acreage).
Soils with variable depths in areas of rocky lava flows	**10 acres** in 4 units that total 392 acres (3% of unit acreage)	**5 acres** in 2 units that total 255 acres (2% of unit acreage)

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 (slopes are over 30 percent). Portions of following units contain slopes greater than 30 percent: 25, 83, 84, 97, and 296. Only Alternative 2 includes unit 296. In order to minimize the potential for soil displacement damage, ground-based equipment would be restricted to existing roads and designated skid trails at all times (Mitigation Measure #1), and operators would be required to winch logs to skidders (Mitigation Measure #2). The majority of activity areas proposed for mechanical harvest are located on gentle to moderately sloping terrain where the maneuvering of equipment generally does not remove soil surface layers in areas that are at least 5 feet in width (FSM 2520). These smaller areas of soil displacement or the mixing of soil and organic matter would not constitute detrimental soil displacement.

The potential for successful regeneration is limited by properties such as soil depth, soil fertility, and temperature extremes on low productivity sites such as frost pockets, cold air drainages, and localized areas of rocky lava flows. Under both action alternatives, all proposed activity areas currently have adequate stocking levels from past regeneration harvest treatments. This indicates that management concerns associated with these sites were successfully addressed by past silvicultural practices. With the overstory removal proposed for this entry, reforestation objectives are less of a concern now that adequate regeneration currently exists on these sites.

Subsoiling is proposed in some activity areas that overlap landtypes containing soils with variable depths on rocky lava flows. Although rock fragments on the surface and within

soil profiles can limit subsoiling opportunities, hydraulic tripping mechanisms on winged subsoiling equipment helps reduce the amount of subsurface rock that could potentially be brought to the surface. Most of the surface organic matter and smaller logging slash would remain in place because the equipment is designed to allow adequate clearance between the tool bar and the surface of the ground.

Coarse Woody Debris (CWD) and Surface Organic Matter

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 adequate nutrient supplies and desirable biological benefits for maintaining soil productivity (Graham et al. 1994).

The proposed harvest activities would reduce potential sources of future CWD, especially where mechanized whole-tree yarding is used in activity areas. However, both action alternatives would likely retain sufficient amounts of CWD following post-harvest activities to meet recommended guidelines. Existing snags and down woody materials would be retained on site. Harvest activities would recruit additional CWD to the forest floor through breakage of limbs and tops during felling and skidding operations. Understory trees, damaged during harvest operations, would also contribute woody materials that provide ground cover protection and a source of nutrients for maintaining soil productivity on treated sites.

Slash disposal treatments would reduce CWD and some of the forest litter by burning slash accumulations at the log landings. Prescribed underburning would not be used as a post-harvest treatment within any of the proposed activity areas. Burning small concentrations of logging slash by the hand pile-and-burn method would have only a minor effect on the overall amount of CWD and surface organic matter within the proposed activity areas.

Cumulative Effects

Of the ongoing or foreseeable future actions (Appendix 3), the Miscellaneous Post-Sale project and the Ponderosa Pine Release project have units that overlap Long Prairie treatments. In the areas of overlap, The Miscellaneous Post-Sale project and the Ponderosa Pine Release project propose to hand-fell small diameter trees. No ground-based equipment would be used and the hand felled trees would be retained on site. There would be no cumulative increase in the estimated percentages of detrimental soil conditions for the activity areas planned with the Long Prairie project (Appendix 2). These non-mechanical vegetation treatments may actually provide beneficial effects to soil productivity by reducing the potential for surface erosion and supplying nutrients as these woody materials gradually decompose on treated sites.

The Rim Woodcutting Area, in the northeastern corner of the project area, overlaps portions of 15 to 18 proposed activity areas depending on the selected alternative. The amount of dead standing and down trees is the primary factor that influences the amount of soil disturbance that can be anticipated within woodcutting areas. Past treatments in these activity areas generally did not retain a great deal of dead fiber. Woodcutter use is expected to be negligible. Many of the existing logging facilities from past timber sales

are typically used by woodcutters because vegetation has already been cleared to allow access. Since conservative estimates were used to account for existing soil conditions, it is expected that the soil disturbance that may occur from woodcutting activities is already included in the estimates of detrimental soil conditions for these activity areas (Appendix 2). Consequently, no measurable increase in detrimental soil conditions is expected from the combined effects of these activities.

Under all action alternatives, the overall effects to soils from the action alternatives combined with all past, present, and reasonably foreseeable management activities comply with Regional (FSM 2520, R-6 Supplement No. 2500-98-1) and LRMP direction for planning and implementing management practices in previously managed areas.

LRMP (Forest Plan) Consistency

Under the action alternatives, equipment operations would cause some new soil disturbances in portions of previously managed areas where ground-based logging is proposed for this entry. 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 in previously managed areas.

Management objectives for this project are as follows:

- 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.
- 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.

Plans for projects must include provisions for mitigation of ground disturbances where activities are expected to cause resource damage that exceeds Regional and LRMP standards and guidelines. Soil restoration treatments would be applied to rectify impacts by reducing the cumulative amount of detrimentally compacted soil committed to temporary roads and logging facilities within specific activity areas (Appendix 2). This would help move conditions toward a net improvement in soil quality for 40 percent of the 203 activity areas proposed for mechanical treatment under Alternative 2 and 48 percent of the 196 activity areas proposed under Alternative 3 (Table 16).

Some activity areas would still have detrimental soil conditions that exceed the 20 percent standard following implementation of project and restoration activities. This is consistent with Regional policy (FSM 2520, R-6 Supplement) and the LRMP interpretation of Forest-wide standards and guidelines SL-3 and SL-4, which is filed in the Deschutes National Forest Supervisor's Office (Final Interpretations, Document 96-01, Soil Productivity, 1996).

Irreversible and Irretrievable Commitments

The action alternatives are not expected to create any impacts that would cause irreversible damage to soil productivity. There is low risk for mechanical disturbances to cause soil mass failures (landslides) due to the inherent stability of dominant landtypes and the lack of seasonally wet soils on steep slopes. Careful planning and the application of Best Management Practices and project design elements would be used to prevent irreversible losses of the soil resource.

The development and use of temporary roads and logging facilities is considered an irretrievable loss of soil productivity until their functions have been served and disturbed sites are returned back to a productive capacity. The action alternatives include soil restoration activities (subsoiling) that would improve the hydrologic function and productivity on detrimentally disturbed soils within the short-term (less than 5 years).

Short-Term Uses of the Human Environment and the Maintenance of Long-Term Productivity

LRMP management requirements and mitigation measures built into the action alternatives ensure that long-term productivity will not be impaired by the application of short-term management practices. The action alternatives would improve soil productivity in specific areas where soil restoration treatments (subsoiling) are implemented on soils committed to temporary roads and logging facilities.

Fisheries and Hydrology

Existing Condition

The project area is within the Little Deschutes 4th Field Watershed and within the Long Prairie 5th Field Watershed. There are no perennial or intermittent stream channels within the project area. Ephemeral drainage channels flow only during high precipitation events or snow melt. The closest surface water is: 1) Paulina Lake, approximately 2.5 miles northeast of the project area, 2) the Little Deschutes River, approximately 2.5 miles west of the project area, and 3) Paulina Creek, approximately 2.7 miles north of the project area. Paulina Creek and the Little Deschutes River are listed by the Oregon Department of Environmental Quality as 303(d) water bodies. Paulina Creek is listed for summer water temperatures. The Little Deschutes River is listed year round for water temperature and dissolved oxygen.

Within the Long Prairie project, there are no fish populations or fish habitat (no perennial or intermittent streamflow). There is no proposed critical habitat for bull trout, nor is there any Essential Fish Habitat for chinook salmon. There are no water bodies listed by the Oregon Department of Environmental Quality for water quality impairment (303(d)) list. There are no Riparian Habitat Conservation Areas as described in INFISH.

Alternatives 1, 2, and 3

Direct, Indirect and Cumulative Effects

Due to the lack of surface water within or near the Long Prairie Mistletoe Reduction Project area, there would be no effects to Oregon Department of Environmental Quality

303(d) listed water bodies, fish populations or habitat, or Essential Fish Habitat for Chinook (Magnuson-Stevens Act).

Scenic Resources

"Scenic attractiveness is the primary indicator of the intrinsic scenic beauty of a landscape and the positive responses it evokes in people. It helps determine landscapes that are important for scenic beauty, based on commonly held perceptions of the beauty of landform, vegetation pattern, composition, surface water characteristics, land use patterns, and cultural features" (*Landscape Aesthetics: A handbook for Scenery Management,* USDA, 1995*)*.

Approximately 5,587 acres of the Long Prairie Mistletoe Reduction Project Area are within MA-9, the Forest Plan Management Area designated for scenic views. This Management Area is allocated as Partial Retention areas, which include Foreground and Middleground distance zones. The Project Area contains three distinct subdivisions within its MA-9, each with its own objectives. They are:

- **Lodgepole Pine-Foregrounds**: Older lodgepole pine stands normally lack visual diversity. Because their crowns are relatively small, and the older trees tend to have a deteriorating appearance, management emphasis in lodgepole pine foregrounds will not be to produce large diameter, older trees. Instead, the emphasis will be on managing healthier, fuller crowned, younger trees (LRMP M9-51).
- **Ponderosa Pine-Foregrounds**: Ponderosa pine in Foreground Scenic Views will be managed to maintain or create a visual mosaic of numerous, large diameter, yellow-barked trees with stands of younger trees offering scenic diversity as seen from sensitive viewer locations, such as from a travel corridor (LRMP M9-4).
- **Mixed Conifer-Middlegrounds**: Mixed conifer stands viewed as middlegrounds will be managed to maintain or create a mosaic of stands with essentially continous tree canopies with scenic diversity provided by natural-appearing openings which resemble those found in the natural landscape. From these viewing distances, immature trees are visually more important than larger old-growth trees, because the crowns of the younger trees are normally fuller and contribute to the overall textural element when viewed from a distance (LRMP M9-34).

Existing Condition

With the bark beetle epidemic in the 1980s, and the subsequent regeneration harvest treatments, approximately 35-40% (between 19,550 to 22,300 acres) of the project area has been impacted. The majority of management activities of this regeneration harvest occurred in lodgepole pine dominated stands. Treatment also occurred in stands of mixed forest, including lodgepole pine, ponderosa pine, and occasionally white fir. Many of the relatively healthy trees, those with good live crown structure, were retained as seed trees and/or shelterwood trees to assure good regeneration of new stands. These leftover trees were retained at wide spacing (an average of 40-60 foot spacing or 12- 27 trees per acre) to assure distribution of seed across the stand, healthy natural regeneration, and in

consideration of other resources such as wildlife habitat. The original intent was to remove these overstory trees once adequate natural regeneration had been established.

Presently, natural regeneration has been mostly well established throughout the project area. The high-density understory trees are approaching or exceed a height of 5 feet. Dwarf mistletoe is found in many of the trees throughout the project area. It is also present in overstory trees retained in regeneration harvest units.

The strong line, form, color, and textural contrast between the young and vigorous natural regeneration stands and the sparse, tall, and mistletoe infected overstory trees is a contradiction to the expected landscape character, especially within lodgepole pine stands. The contrast and contradiction appears unnatural to casual visitors to the area and degrades the overall scenic quality and scenic integrity within the project area. This condition does not meet Desired Visual Condition as specified under the Deschutes NF LRMP and does not represent the landscape character of Central Oregon.

Alternative 1: No Action Alternative

Direct and Indirect Effects

Under this alternative, the Long Prairie project area would not be altered by any proposed management activity. Scenic quality, scenic integrity level, and landscape character would remain about the same during the short-term period, and the Desired Visual Condition would continue to not be met. The current vegetation condition would continue to degrade, thus affecting long-term scenic quality.

Under this alternative, the Desired Future Condition for Scenic Resources (MA-9) within the Long Prairie project area under the Deschutes National Forest LRMP direction would not be met.

Alternatives 2 and 3

Direct and Indirect Effects

The proposed treatments represent approximately 50-60% of natural regeneration units within the Long Prairie project area. Alternative 2 proposes treatments in the following units that would have a direct effect on scenic resources along the Road 22 scenic corridor: Units 98, 108, 109, 110, 118, 138, 139, 160, 173, 178, 190, 203, 204, 205, 219, and 246. Alternative 3 proposes treatments in these units, and adds Units 157 and 237.

The proposed treatment activities would enhance both short-term (0-5 years) and long-term (5 years and beyond) scenic quality, while at the same time meeting the Desired Future Condition (M9-15, M9-34, M9-64).

- **Lodgepole Pine-Foregrounds** (SV2=Partial Retention Foreground)**:** A total of 646 acres (approximately 11.6% of the 5,587 acres within the Scenic Views allocation area) within the Lodgepole pine foregrounds and 72 acres (approximately 1.3% of the 5,587 acres) within the Lodgepole pine Middleground (SV4= Partial Retention Middleground) would be treated to remove the mistletoe infected overstory. In this short term, this would eliminate the existing contradiction between the actual and expected landscape characters, and in the

long term would move treatment units within this subdivision toward the desired visual quality condition encouraging the development of healthy, full crowned young trees.

- **Ponderosa Pine-Foregrounds (SV2=Partial Retention):** A total of 152 acres (2.7% of the Scenic Views allocation area) within the Ponderosa Pine foreground would be treated to remove mistletoe infected trees in this subdivision would be consistent with LRMP M9-5, which states that trees may be removed as necessary to control disease problems. A visual mosaic, as described in LRMP M9-4, would be maintained or created by retaining the existing overstory in retention areas and outside units, while encouraging the growth of healthy younger trees within treatment units.
- **Mixed Conifer-Foregrounds** (SV2=Partial Retention Foreground) **and** Mixed Conifer **Middlegrounds** (SV4=Partial Retention Middleground): Treatments in this subdivision would encourage the development of healthy immature trees, and would be consistent with LRMP M9-32, which indicates that large trees may be removed if there is a significant disease problem in the stand. However, since the proposed treatments in this subdivision represent such a small percentage of the total treatments (11 acres or 0.2% of the 5,587 acres) the effects to the Mixed Conifer-Middleground subdivision are expected to be insignificant.

With the help of effective management practices, including protection and retention of residual trees, post treatment activities, effective implementation of recommended mitigation measures, and on-site monitoring, and the following results are expected:

- The short-term (within a period of 0 to 5 years) effects would be slightly altered landscape character, scenic quality and scenic integrity. Such short-term effects may be visible to local residents and casual forest visitors.
- The long-term (beyond 5 years) effects would be beneficial to landscape character, scenic quality, and scenic integrity level. The existing strong line, form, color, and textural contrast would be greatly reduced to a more uniform, consistent pattern, particularly within lodgepole pine stands.
- The residual slash and debris, following treatment activities, would be minimal and would blend well with the existing environment. The effect is not expected to be highly noticeable or visible to visitors to the project area two years after treatment activities are completed.

Both Action Alternatives would contribute toward the development of the Desired Visual Condition described in the Deschutes LRMP.

Cumulative Effects

Based on reasonably foreseeable future actions proposed along Forest Road 22 scenic corridor, the cumulative effect(s) on scenic resources is expected to slightly alter existing landscape character, scenic quality, and scenic integrity level. These proposed actions include: miscellaneous post treatment activities, ponderosa pine release thinning, pre-commercial thinning of lodgepole pine, whip falling, and dwarf mistletoe control. All these proposed actions are expected to add to the short and long-term alteration of

landscape character, scenic quality, and scenic integrity level of Road 22 travel and scenic corridor within the Long Prairie analysis area.

Heritage Resources

Cultural resources include historic and archaeological sites and resources used by humans in the past. Management direction for cultural resources is found in the Deschutes National Forest Resources Management Plan, in the Forest Service Manual section 2360, in Federal Regulations 36CFR64 and 36CFR800 (amended May 1999), in the 1995 and 2003 Programmatic Agreements Among USDA Forest Service Region 6, Oregon State Historic Preservation Office and the Advisory Council on Historic Preservation Regarding Cultural Resource Management in the State of Oregon, 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.

The Forest Plan requires consideration of 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, and protect or mitigate effects to resources that are eligible (CR-2, CR-3, and CR-4).

Cultural resources are fragile and non-renewable resources that chronicle the history of people using the forested environment. They include:

- Historic properties; places that are eligible for inclusion in the National Register of Historic Places (NRHP) by virtue of their historic, archaeological, architectural, engineering, or cultural significance. Buildings, structures, sites, and non-portable objects (e.g., signs, heavy equipment) may be considered historic properties. Historic properties are subject to the NRHP's Section 106 review process;
- Traditional cultural properties (TCPs); localities that are considered significant in light of the role(s) they play in a community's historically rooted beliefs, customs, and practices may also be considered historic properties;
- American Indian sacred sites that are located on federal lands. These may or may not be historic properties; and
- Cultural uses of the natural environment (e.g., subsistence use of plants or animals) that must be considered under NEPA.

Government-to-government consultation with the tribes has occurred in the format of a scoping letter describing the project area and proposed action, and a document containing the alternatives and maps of the project area; the tribes were invited to comment on each. No special concerns about Tribal resources were identified. It is acknowledged that the Tribes may have lost the verbal history and they may not know where desired plant species and resources may be found. This affects their ability to tell Federal agencies where Tribal trust resources can be located on Federal lands. See page 3-323 for more discussion of culturally important plants.

Existing Condition

In accordance with Forest Plan Standards and Guidelines (CR-1), a professionally supervised cultural resource inventory program has been developed for the Forest and District level projects. In the early 1990s a Geographic Information Systems (GIS) database was developed to summarize and compile known and newly recorded cultural resource information identified through surveys. Surveys are conducted using standards meeting the inventory plan and research design agreed to by the Forest Service and the Oregon Historic Preservation Office (OSHPO). A GIS analysis for previous surveys and sites was completed for the Long Prairie Project area. An analysis for the entire project area for the total number of previous surveys and sites was made. The analysis shows 27,860 acres or 50% has been previously surveyed. A total of 45 cultural resource sites have been recorded, 17 small sites (2 acres or less), 25 larger sites (over 2 acres), and 3 linear features. Sixteen sites have been determined to be eligible for the National Register of Historic Places (NRHP); 12 sites have been determined ineligible; and the remaining 17 sites have not been evaluated and are potentially eligible for the NRHP. There are 5 small sites in proposed treatment units; three are unevaluated and are potentially eligible, and the remaining two are not eligible. There are 8 larger sites in units to be treated, with 5 sites being eligible and 3 sites unevaluated and therefore potentially eligible. Unit boundaries have been configured to avoid the sites through project design. There is one line feature that runs through a unit, but it is not eligible and needs no further management or protection

The Long Prairie Mistletoe Reduction Project area lies outside of lands ceded to the Confederated Tribes of Warm Springs according to the 1855 Treaty with the Tribes of Middle Oregon, it does however, fall with the aborginal lands of the Klamath Tribes, and may have also received use by ancestors of the Burns Paiute Tribe.

Alternative 1

Direct and Indirect Effects

Under this alternative none of the proposed actions would be implemented and there would be no direct impacts to cultural resources. Fire risk would continue to increase as fuel loads accumulate over time and could have an effect on cultural properties by exceeding temperature thresholds that are known to damage sites or reveal new sites

Cumulative Effects

There would be no cumulative effects associated with the No Action alternative.

Alternatives 2 and 3

Under the National Historic Preservation Act, as amended, and its implementing regulations found in 36 CFR 800, “effect” means alteration to the characteristics of an historic property qualifying it for inclusion in or eligibility for the National Register of Historic Places (36 CFR 800.16 (i)). Integrity of the property’s location, design, setting, materials, workmanship, feeling, or association is considered when determining site eligibility. Examples of adverse effects on historic properties include but are not limited to physical destruction, damage, or alteration of all or part of the property.

Direct and Indirect Effects
The primary management option to mitigate potential adverse impacts to lithic scatter sites caused by ground disturbing is site avoidance. The three unevaluated small sites located in treatment units will be flagged for avoidance prior to project implementation.

Under these alternatives fuel treatments would reduce fire risk to cultural properties by eliminating much of the fuel loading that accumulates over time that could cause high temperatures that are known to damage sites.

Following guidelines in our 1995 Regional Programmatic Agreement (PA) among USDA-Forest Service, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Office, a finding of No Adverse Effect under Section 106 of the NHPA has been determined for this project.

Cumulative Effects
Present and reasonably foreseeable future actions that may have effects on sites include continued management of roads and plantations. These actions can be viewed as long term effects. In an archaeological sense, they are irreversible because the resource is finite and non-renewable. Whether they are irretrievable effects, however, would depend on whether archaeologically significant information is still present, despite the impacts. Natural processes also contribute to cumulative effect, although they are not within our control. Erosion, weathering, and decomposition of perishable materials are examples of on-going, natural processes. Incrementally, these impacts affect site context and integrity.

Road Access

Existing Condition

There are approximately 327.7 miles of open Forest Service roads within the project area. There is a Cooperative Travel Management Area (TMA) in the southwestern portion of the project area. Oregon Department of Fish and Wildlife identifies the TMA as the Spring Butte Closure. Motor vehicle use in the closure area is limited year round to specific roads. Within the portion of the TMA that overlaps the Long Prairie project area, approximately 30 miles of road are closed to travel.

The Deschutes LRMP identifies a desired road density of 2.5 miles per square mile for the management allocations within the planning area. Densities are to be used as thresholds for evaluation and not to serve as the basis for assessing Forest Plan conformance. Current open road density within the project area is 3.3 miles per square mile.

Alternative 1

Direct and Indirect Effects
There would be no change in the existing road density.

Cumulative Effects
Approximately 45.3 miles of road closures from prior decisions (Appendix 3 and Project Planning Record) will be implemented through time as funding allows. Implementation

of all planned road closures would reduce open road density within the project area to 2.8 miles per square mile.

Alternatives 2 and 3

Direct and Indirect Effects

Road management activities associated with local roads would include normal road maintenance activities. With Alternative 2, approximately 43 miles of temporary roads would be needed to provide access for timber harvest activities. With Alternative 3, approximately 33 miles of temporary roads would be needed. All temporary roads would be located on pre-existing, unclassified road prisms. There would be minimal additional ground disturbance. These roads would be decommissioned following timber harvest.

Roads needed to access some units proposed for timber harvest with the Long Prairie project have been identified in past decisions for closure (Appendix 3 and Project Planning Record). There could be opportunities to implement previously planned road closures with planned timber sale activities associated with the Long Prairie project.

Cumulative Effects

Open road density would be as described for Alternative 1.

Inventoried Roadless Areas

Existing Condition

The FEIS for the Roadless Conservation Final Rule (Volume 2 – Maps) identifies two Inventoried Roadless Areas (IRA) northeast of the Long Prairie Project Area (Map 13). Both IRAs are within Newberry National Volcanic Monument. The FEIS for Newberry National Volcanic Monument Comprehensive Management Plan and Appendix C of the FEIS for the Deschutes National Forest Land and Resource Management Plan (LRMP) identify these roadless areas as the North and South Paulina Roadless Areas. The FEISs for the Monument Plan (Pages 196-1999) and the Deschutes LRMP (Appendix C-7 and C-48 through C-61) include descriptions and maps of the two roadless areas. The remainder of this section summarizes information from these documents. Information focuses on the South Paulina Roadless Area due to its adjacency to the Long Prairie Project Area. Unless otherwise referenced, information is summarized from the Monument FEIS.

The North and South Paulina Roadless Areas form two crescents surrounding Newberry Caldera. The North Paulina Roadless Area contains about 22,000 acres, and the South Paulina Roadless Area encompasses about 10,000 acres. Both areas were considered for formal wilderness designation during the Roadless Area Review and Evaluation (RARE II) process in the 1980s. They were not included for formal wilderness designation. Both areas were absorbed into Newberry National Monument and Monument legislation in 1990.

The North Paulina Roadless Area stretches from inside the caldera between the lakes north up to the rim of the caldera, and then down the northern flanks of Newberry Volcano. The South Paulina Roadless Area forms a crescent south of the caldera. The

northern portion is adjacent to an area of developed recreational use. Developed sites include a number of popular day use areas in the caldera, such as The Big Obsidian Flow and Paulina Peak. Recreational use is moderate. The proximity to developed day use sites means more visitors will "spill over" into parts of the Roadless Area for recreation. Overall, the opportunity for primitive recreation is low (Appendix C, Deschutes LRMP). This is due primarily to the lack of diverse recreational opportunities compared to other existing wilderness and undeveloped areas. Overall, there is moderate opportunity for solitude (Appendix C, Deschutes LRMP). The Roadless Area is not large enough to adequately buffer outside influences, especially noise.

Most of the wildlife in this Roadless Area is associated with the "late successional" (mature) lodgepole pine forests. Deer, elk, ground squirrels, American marten, black bear, and a variety of birds are the principal species of observed wildlife in this area. Unique geologic features include part of the Big Obsidian Flow and outstanding scenery. The view along Paulina Peak ridge is described in the Monument FEIS as "spectacular." On a clear day, the Cascades can be seen north into Washington and south into California. The Oregon High Desert can be viewed to the south and east. Included in this desert view is Fort Rock, site of one of the oldest archaeological finds in North America.

Approximately 1% of the South Paulina Inventoried Roadless Area is included within the boundary of the Long Prairie project area. There are six separate areas where this overlap occurs (Map 13). Five are large enough to be visible on the map. Areas of overlap range in size from 1 to 52 acres. These areas are all located outside of the boundary of Newberry National Volcanic Monument. The Roadless Area Conservation Map (2000) for the Deschutes National Forest, identifies these small portions of the IRA outside of the Monument as allowing road construction and reconstruction.

The effects discussion will focus on the following resources or features identified in the Final Rule for Roadless Area Conservation (36 CFR Part 294, January 12, 2001) as often being present in and characterizing inventoried roadless areas:

1) High quality or undisturbed soil, water , and air;
2) Sources of public drinking water;
3) Diversity of plant and animal communities;
4) Habitat for threatened, endangered, proposed, candidate, and sensitive speices and for those species dependent on large, undisturbed areas of land;
5) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation;
6) Reference landscapes;
7) Natural appearing landscapes with high quality scenic quality;
8) Traditional cultural properties and sacred sites; and
9) Other locally identified unique characterisitics.

Alternative 1

Direct and Indirect Effects

There would be no direct effects on the Inventoried Roadless Areas from the No Action alternative. No activities would take place that would have direct effect on the roadless character of the areas.

Cumulative Effects

Past timber harvest and woodcutting activities within the Long Prairie Project Area have created landscape textures and patterns that are evident from view points along Paulina Peak ridge. From these viewpoints, it is obvious to the casual observer that the area has been modified by human activity.

All ongoing and reasonably foreseeable future actions are located outside of the Paulina Inventoried Roadless Area. Actions occurring closest to the IRA include those in the: Rim woodcutting area, Miscellaneous Postsale project, Ponderosa Pine Release project, and future precommercial thinning projects. The northern boundary of the Rim woodcutting area is Road 2125. The southern IRA boundary is approximately 200 feet north of Road 2125. Future precommercial thinning treatments would be 200 feet or farther from the IRA boundary. Areas treated with the ponderosa pine release project would be 400 feet or farther from the IRA boundary. Areas treated with the Miscellaneous postsale project would be 2 miles or farther from the boundary.

These ongoing and future actions would have no effect on soil, water, air, diversity of plant and animal communities, landscapes, or cultural properties that are present in the Paulina IRA. Changes in vegetation outside of the IRA resulting from these actions would generally not be discernable from the view points along Paulina Peak ridge. These ongoing and future actions could have short-term impacts on the feeling of solitude that recreationists may experience within the South Paulina Roadless Area. Proposed treatments would be evidenced primarily by the sounds of chainsaw operations.

Alternatives 2 and 3

Direct and Indirect Effects

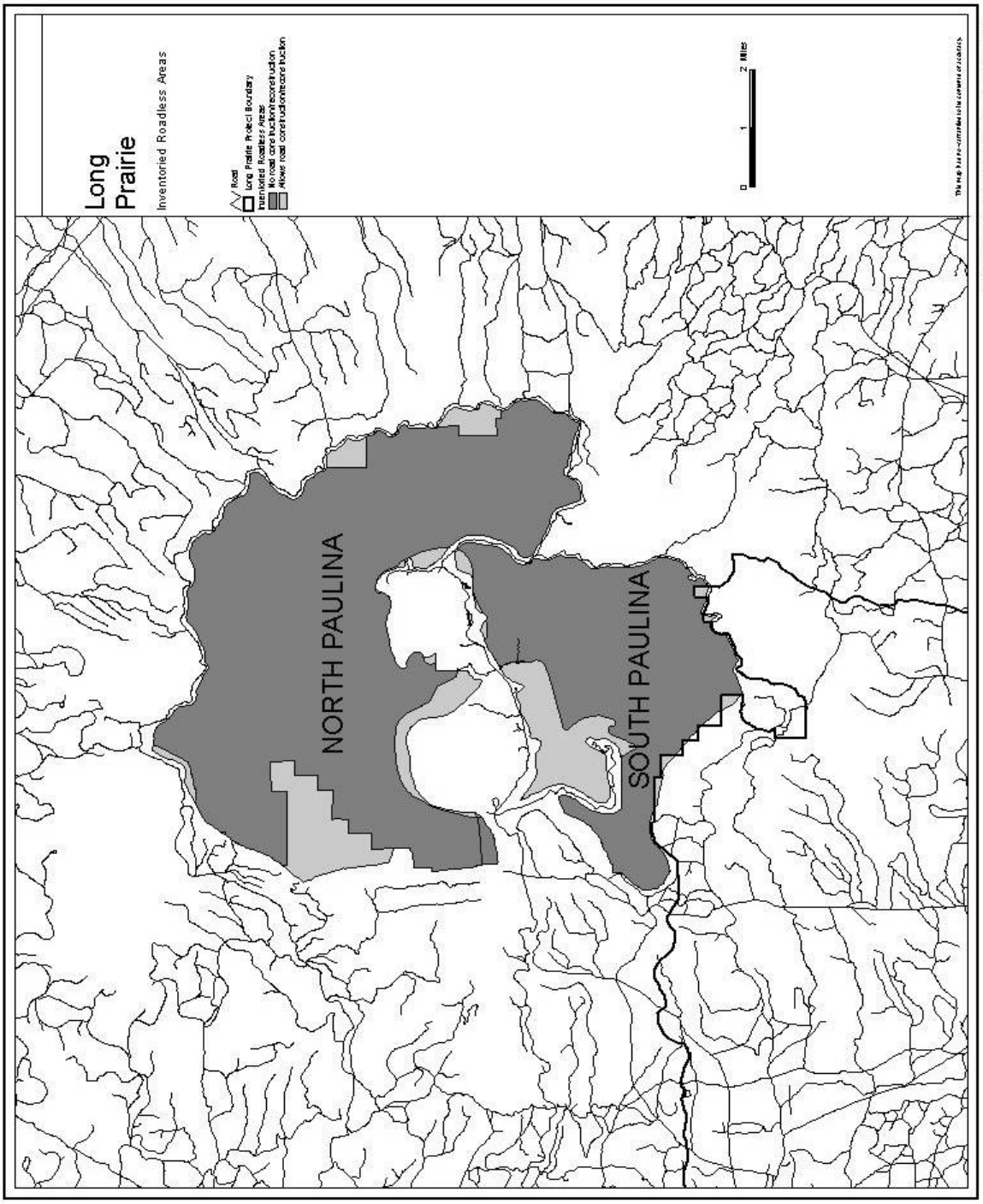
No treatments are proposed within Inventoried Roadless Areas.

Alternative 2 and 3 treatments would have no effect on roadless area characteristics in the North Paulina Roadless Area. Proposed treatments and the Roadless Area are geographically separated by Newberry Crater, which would block sites and sounds associated with proposed treatments.

Alternatives 2 and 3 treatments would have no effect on soil, water, diversity of plant and animal communities, landscapes, or cultural properties that are present in the Paulina IRA. Proposed treatments are 200 feet or farther from the southern boundary of the Paulina IRA. Treatments could have a short-term impact on the feeling of solitude that may be experienced by recreationists within the South Paulina Roadless Area. Proposed harvest treatments would be evidenced primarily by the sounds of harvest operations and the sight of smoke rising from landing piles being burned. There could be a short-term impact on air quality if smoke from pile burning drifts into the Roadless Area. Changes in vegetation resulting from proposed actions would generally not be discernable from vista points along Paulina Peak ridge. Connectivity would be retained between late or old structural stage forests within the Inventoried Roadless Area and the Long Prairie Project Area.

Cumulative Effects

Cumulative effects would be similar to those described under Alternative 1.



Map 13. Inventoried Roadless Areas Adjacent to Long Prairie Project Area.

Unroaded Areas

Unroaded areas are defined in the FEIS for the Roadless Area Conservation Final Rule as "any area, without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with the inventoried roadless area." (USFS 2000, page G-12). Unroaded areas have typically not been inventoried and are, therefore, separate from inventoried roadless areas. This document uses the term "unroaded area" to differentiate these areas from inventoried roadless areas. There are no Forest-wide or Management Area standards specific to unroaded areas in the Deschutes Forest Plan.

The Oregon Natural Resources Council (ONRC) submitted a map that displays two unroaded areas within the Long Prairie Project Area. ONRC identified one of the areas as being lava. The other unroaded area was identified as the Topso Butte unroaded area. According to ONRC, the Topso unroaded area is 1,989 acres and has significant ecological value. ONRC also stated activities that enter this area threaten to degrade the special character of this unroaded area. ONRC indicated the Forest Service should acknowledge this roadless area and disclose the impacts of proposed treatments.

Using the ONRC Roadless Map as a starting point, three unroaded areas were delineated in the Long Prairie Project Area (See Map 14). Boundaries were changed from those on the ONRC map to better correspond with existing roads. Unroaded Area 1 (3,289 acres) includes the area ONRC identifies as the Topso roadless area. Areas 2 (1,142 acres) and 3 (802 acres) include the area identified by ONRC as a lava flow.

Existing Condition

The Deschutes LRMP allocates these unroaded areas to General Forest (GFO), Old Growth (OGR), and Scenic Views Partial Retention Middleground (SV4) (Map 16). Plant association groups (PAG) in unroaded areas include lodgepole pine dry, ponderosa pine dry and mixed conifer dry (Table 18). Lodgepole pine is the dominant PAG. The majority of the ponderosa pine dry PAG, is within allocated old growth areas. Approximately half of the mixed conifer PAG is within allocated old growth. Extensive timber management activities have occurred within the general forest and scenic view allocations in area 1 and 2 (Map 14). The eastern portion of Area 1 includes Topso Butte, portions of Box and Kweo Buttes, and one unnamed butte. Area 2 includes one unnamed butte. In Areas 1 and 2, allocated Old Growth areas are located around the buttes. Surveyors Lava Flow makes up Area 3.

Table 18. Proportion of plant association groups and past harvest activities within unroaded areas.

Unroaded Area	Plant Association Groups				Past Harvest	
	Lodgepole pine dry	Ponderosa pine dry	Mixed Conifer dry	Lava/Pumice/ Cinder	Acres	% of Area
1 (3,289 acres)	78%	4%	18%	<1%	1,426	43%
2 (1,142 acres)	75%	17%	8%	<1%	535	47%
3 (802 acres)	6%	7%	----	87%	4	<1%

The Deschutes LRMP identifies the General Forest management area will be managed to provide the recreation activity, setting, and experience of the Recreation Opportunity Spectrum (ROS) category of Roaded-Natural[2] or Roaded Modified[3] (Standard and Guideline M8-5). The ROS standard in the Scenic Views management area will normally be Roaded Natural, but may also include Primitive, Semi-primitive Non-motorized, Semi-primitive Motorized and Semi-primitive Motorized Winter Only standards.

Resources or features often present in roadless areas were previously listed in the Inventoried Roadless Area Section. Many of these resources or features are currently not present within these unroaded areas.

There are no water resources within the unroaded areas. Consequently, the unroaded areas do not provide a source of public drinking water. There is no habitat for threatened, endangered, proposed, candidate, or sensitive species. These areas provide the recreation activity, setting, and experience (ROS) of roaded modified or roaded natural. These areas have been heavily modified by human activity. Harvest activities have occurred on 40 to 50% of unroaded areas 1 and 2 (Table 18). Access to the perimeter of the areas is generally easy for highway vehicles. There are no known traditional cultural properties or sacred sites in the unroaded areas. No unique characteristics have been identified within the unroaded areas.

Alternative 1

Direct and Indirect Effects

There would be no direct effects on the existing characteristics of the unroaded areas. No activities would take place that would have direct effects on the roadless character of the areas.

Cumulative Effects

The Rim Personal Use Woodcutting Area overlaps with Unroaded Area 1. Woodcutting has the potential to disturb soil in areas not previously harvested. These areas generally have the greatest amount of dead wood fiber. Slight increases in detrimental soil conditions will occur from woodcutters driving off of classified roads to access dead wood fiber. Woodcutting will have no effect on the diversity of plant and animal communities within the unroaded area. Woodcutting is limited to the removal of standing dead and down dead lodgepole pine. Removal of down dead could reduce foraging habitat for the American marten. The majority of woodcutting activity is occurring adjacent to system roads. Down wood away from system roads within the interior of the

[2]**Roaded Natural.** Area is characterized by predominately natural appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction among users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities. Large mammals tolerant of humans may be present; those not tolerant present infrequently. There is a prevalence of smaller wildlife species (Deschutes LRMP, Appendix 2).

[3]**Roaded Modified.** This area is characterized by a setting that is heavily modified by human activity. Access is generally easy for highway vehicles. The setting is generally the result of intensive commodity production. There is no size criteria. Concentration of users is low, but there is considerable evidence of others. Users have a moderate degree of isolation from the sights and sounds of other people (Deschutes LRMP, Appendix 2).

unroaded areas is generally inaccessible to woodcutters. No woodcutting is allowed within old growth areas. While marten foraging habitat could be reduced, large, somewhat dense stands of lodgepole pine and mixed conifer will remain. Woodcutter slash and tree stumps provide additional evidence of human activity.

The Miscellaneous Postsale project includes 3 treatment areas that extend approximately 300 to 600 feet into the eastern portion of Unroaded Area 1. The project also has one treatment area that extends approximately 1,000 feet into the southern portion of Unroaded Area 2. The Ponderosa Pine Release Project has one treatment area that extends approximately 600 feet into the western portion of Unroaded Area 2. Treatments associated with these projects will have no effects on undisturbed soils within the unroaded areas. With both projects, treatments will occur in areas previously harvested. Treatments will not affect the existing diversity of plant and animal communities within the unroaded areas. Past treatments have opened up the forest canopy. The felling of small diameter trees that will occur with these projects will not change the existing diversity of plants within the treatment areas. Treatments are located along the edges of the unroaded areas. Treatments will not reduce the amount of interior, undisturbed areas.

Alternatives 2 and 3

Direct and Indirect Effects

There would be no direct or indirect effects from the action alternatives to Unroaded Area 3 (Surveyors Lava Flow). No activities from the action alternatives would take place in that area.

Table 19 and Map 15 display treatments that would overlap Unroaded Areas 2 and 3. All units overlap areas that have been previously harvested. Temporary roads used in the past to access these areas were closed following harvest activities. With the exception of Unit 30, proposed treatment units are within General Forest (GFO). Unit 30 is within Scenic Views Partial Retention Middleground (SV4). With Alternative 2, approximately 6.6 miles of temporary roads would be needed to provide access for proposed harvest (HFR). With Alternative 3, which proposes less harvest in the unroaded areas, approximately 4.5 miles of temporary roads would be needed. Map 17 displays temporary roads that would be needed in the unroaded areas. Temporary roads would be primarily within proposed treatment units. They would be located on pre-existing, unclassified road prisms. Temporary roads would be closed following treatments. In units 48, 65, and 83, logging facilities, including temporary roads, would be subsoiled to rehabilitate detrimentally compacted soils. There would be no permanent road construction in the unroaded areas.

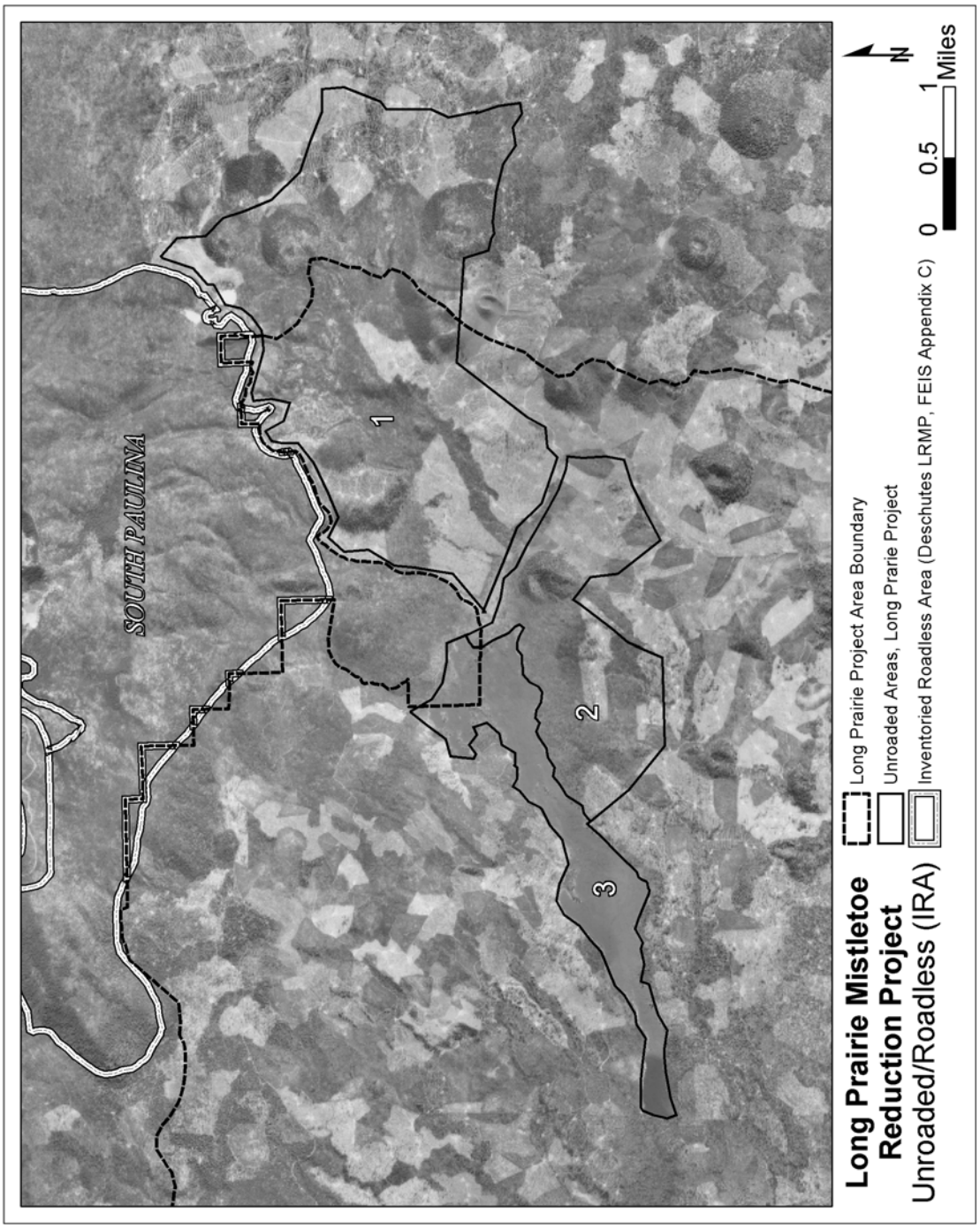
Table 19. Proposed treatments within unroaded areas.

Unroaded Area/ Treatment Unit Number	Management Allocation	Acres	Alternative 2 Proposed Treatment	Alternative 3 Proposed Treatment	Temporary Road (Length and Area)
Area 1					
Unit 18	GFO	58	None	Seedtree Removal (HFR)	None
Unit 30	SV4	84	Seedtree Removal (HFR)	Fall/Prune/Girdle	0.99 miles 1.4 acres
Unit 48	GFO	217	Seedtree Removal (HFR)	Seedtree Removal (HFR)	2.07 miles 3.0 acres
Unit 65	GFO	190	Seedtree Removal (HFR)	Seedtree Removal (HFR)	0.92 miles 1.3 acres
Area 2					
Unit 83	GFO	56	Seedtree Removal (HFR)	Seedtree Removal (HFR)	0.76 miles 1.1 acres
Unit 86	GFO	77 (Alt 2) 106 (Alt 3)	Seedtree Removal (HFR)	Seedtree Removal (HFR)	0.79 miles 1.1 acres
Unit 89	GFO	96	Seedtree Removal (HFR)	Fall/Prune/Girdle	0.58 miles 0.8 acres
Unit 90	GFO	80	Seedtree Removal (HFR)	Fall/Prune/Girdle	0.37 miles 0.54 acres
Unit 100	GFO	182	Seedtree Removal (HFR)	Fall/Prune/Girdle	0.15 miles 0.22 acres

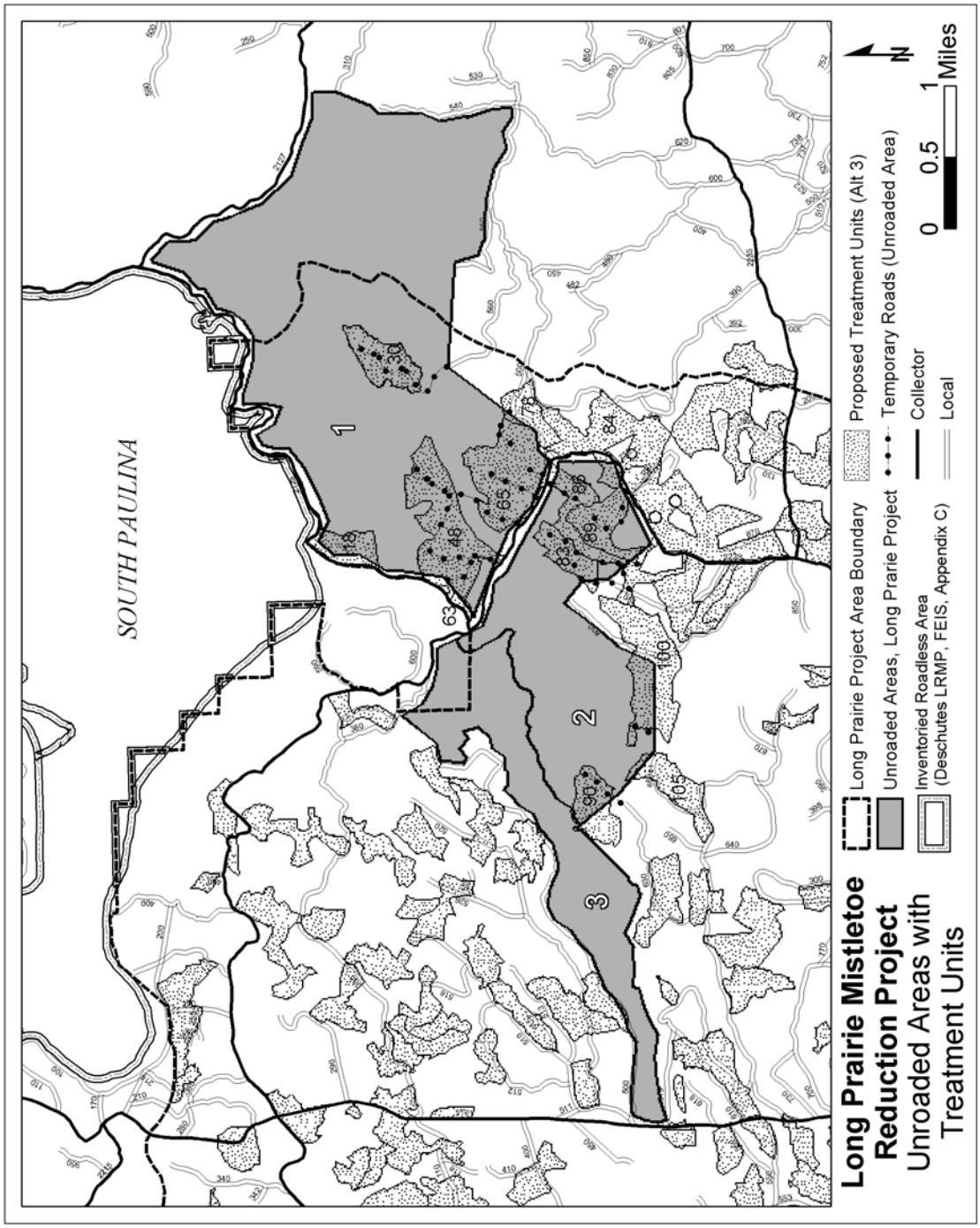
Alternative 2 and 3 treatments would not affect areas with undisturbed soils. Treatments would occur in areas with past harvest activities. Detrimental soil conditions presently exist (Appendix 2). The proposed overstory treatments would not affect the existing diversity of plant and animal communities within the unroaded areas. Past treatments have opened up the forest canopy. Overstory treatments would not change the existing diversity of plants within these previously treated areas. Treatments would not reduce the amount of large, undisturbed areas with denser forest canopy in the interior of the unroaded areas. Proposed treatments would not change the class of dispersed recreation present within the unroaded areas (Roaded Natural and Roaded Modified). Harvest treatments would be evidenced by the sites and sounds of harvest operations, skid trails, landings, temporary roads, stumps, and damaged understory trees. Proposed fall/prune/girdle treatments would be evidenced in the short term by the sites and sounds of chainsaw operation, felled trees retained on site, and girdle bands on tree boles. Alternative 3, with less mechanical harvest proposed in the unroaded areas, would have the least impact of the two action alternatives.

Cumulative Effects

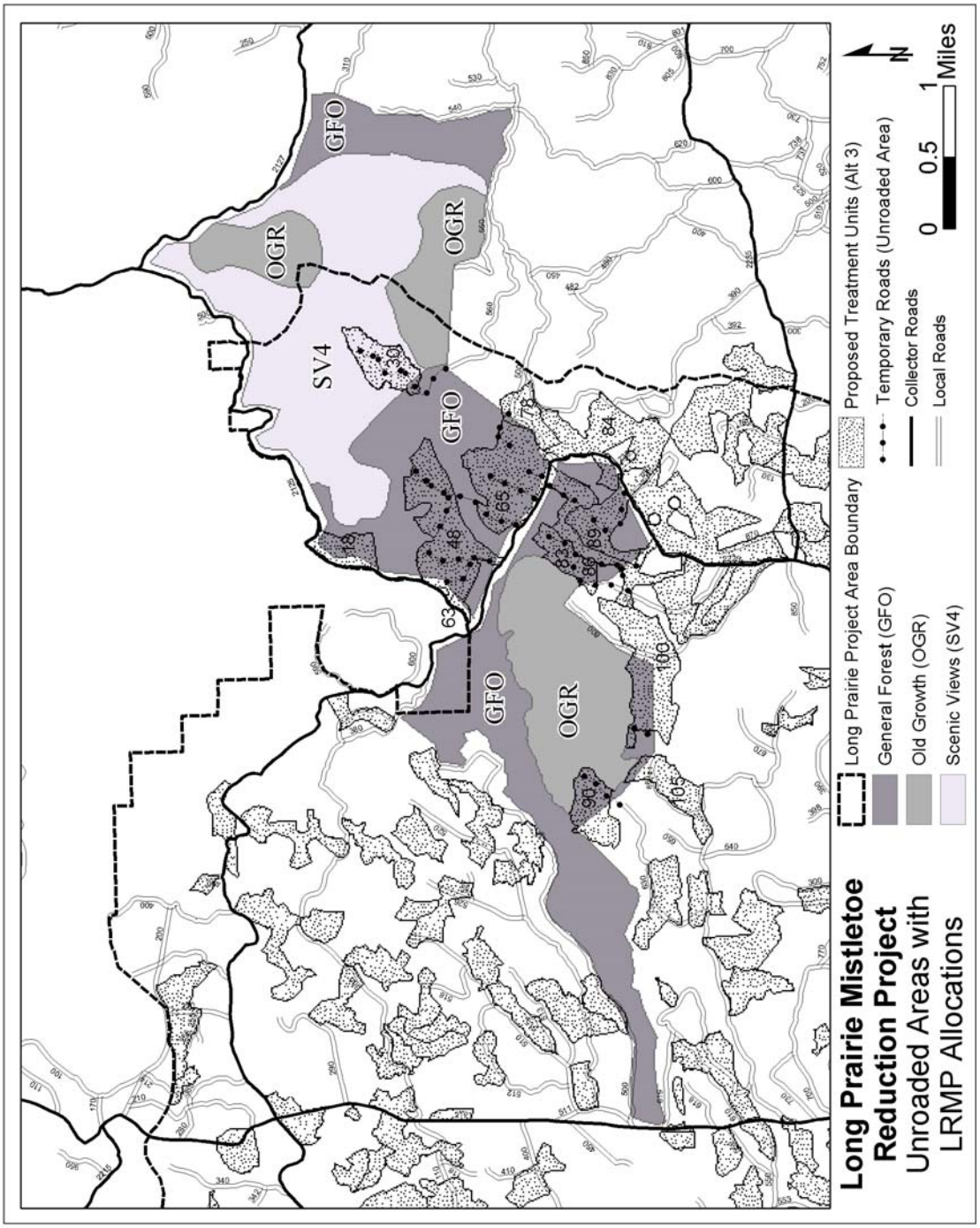
Treatment areas included in the Miscellaneous Postsale project and the Ponderosa Pine Release project do not overlap with areas proposed for treatment in the Long Prairie Project. Treatment areas in these three projects would be aggregated together in areas that have been previously harvested. Collectively, these treatments will not reduce existing undisturbed areas located in the interior of the unroaded areas. Effects of the Rim Personal Use Woodcutting Area would be as described for Alternative 1.



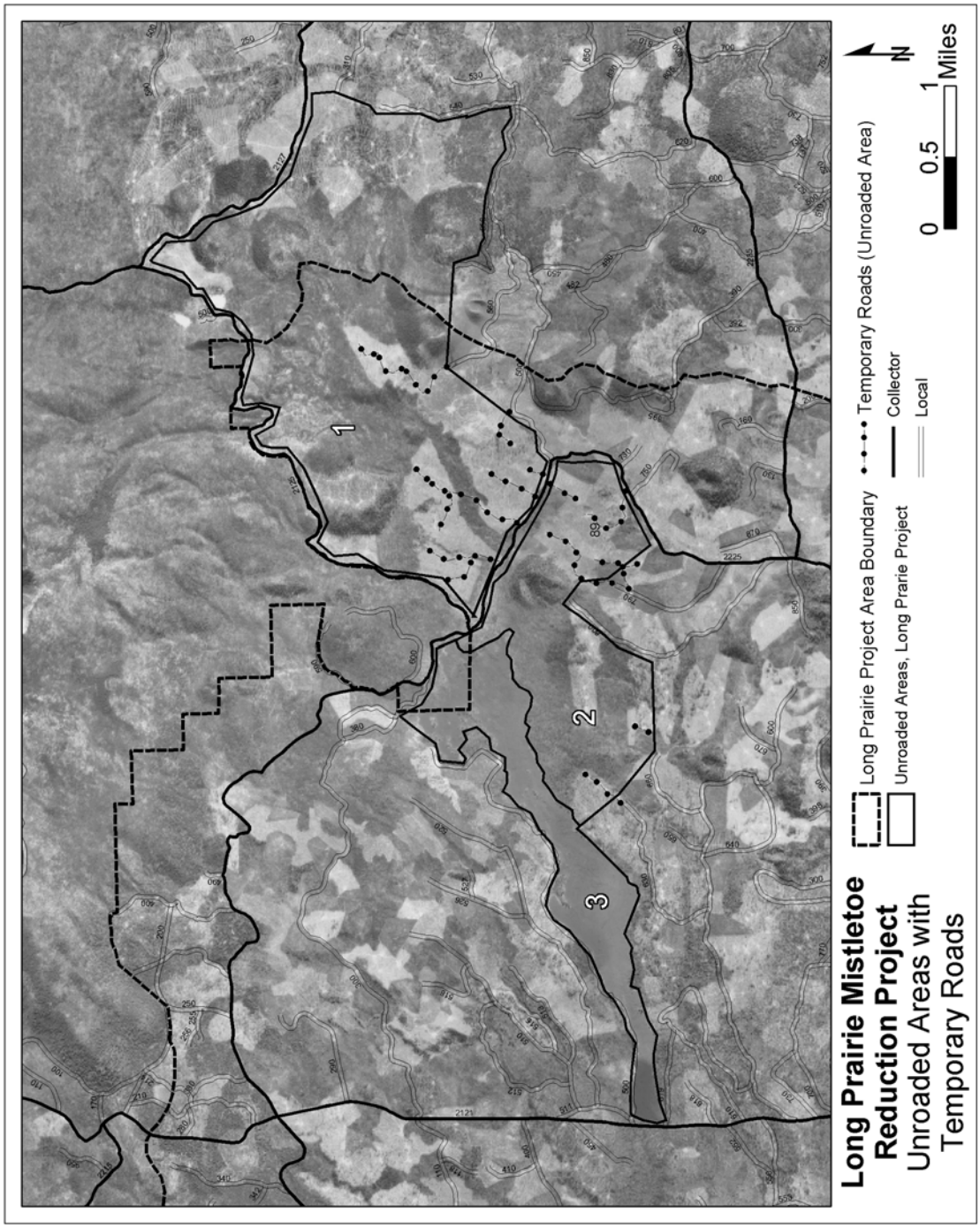
Map 14. Unroaded Areas in the Long Prairie Mistletoe Reduction Project Area.



Map 15. Proposed Treatment Units in Unroaded Areas in the Long Prairie Mistletoe Reduction Project Area.



Map 16. Deschutes LRMP Management Areas in Unroaded Areas in the Long Prairie Mistletoe Reduction Project Area.



Map 17. Proposed Temporary Roads in Unroaded Areas in the Long Prairie Mistletoe Reduction Project Area.

Grazing

Existing Condition

The Long Prairie project area overlaps portions of four grazing allotments (Table 20). The Big Hole, Crater Buttes, Sand Flat, and Spring Butte Allotments are vacant sheep and goat allotments. Allotments classified as vacant require that appropriate and current analysis (NEPA) be completed before their status is changed.

Table 20. Grazing allotments and their status.

Allotment	Total Allotment Acres	Permitted Livestock Type	Last Year Actively Grazed/Status
Big Hole	33,310	Sheep	1990/Vacant
Crater Buttes	26,416	Sheep	1975/Vacant
Sand Flat	29,325	Sheep	1990/Vacant
Spring Butte	28,805	Sheep	1990/Vacant

Alternatives 1, 2, and 3

Direct and Indirect Effects

Given the vacant status of the allotments, there would be no direct or indirect effects.

Cumulative Effects

The Crater Buttes Allotment is currently under analysis with the Cluster II Range EA. Scoping for a proposed action that would close the allotment to grazing is scheduled to begin in the fall of 2004. The other three allotments will be analyzed in the future either by 2011 under the 1995 Recessions Bill direction, or during the upcoming Forest Plan revision.

Given the vacant status of the allotments, and no foreseeable plans for future grazing, there would be no cumulative effects.

Fire/Fuels and Air Quality

The following summarizes the Fire, Fuels and Air Quality report completed for the Long Prairie Mistletoe Reduction Project. Table 21 summarizes the acres of fuels treatments proposed in each alternative.

Fire/Fuels

Alternative 1

Under the No Action alternative, no fuels management activities would occur.

Alternative 2

Fuel treatment consists of whole tree yarding material to a landing and burning the landing piles (8,180 acres).

Alternative 3

Fuel treatment in areas proposed for commercial harvest consists of whole tree yarding material to a landing and burning the landing piles (7,865 acres). In areas proposed for felling/girdling/pruning, trees felled within 200 feet of a two or four digit road would be treated to reduce fuel loadings. Treatment consists of severing branches from those trees that are felled, hand piling a portion of the slash, and burning the hand piles (3,590 acres).

Table 21. Fuel treatment acres.

Fuels Treatment	Alternative 1	Alternative 2	Alternative 3
Landing Piles	0 acres	8,180 acres	7,865 acres
Hand Piles	0 acres	0 acres	3,590 acres
Total	0 acres	8,180 acres	11,455 acres

Air Quality

Alternative 1

During a high intensity wildfire, smoke emission particulate matter of 10 microns and less in size (PM 10) could range from 500 lbs. per acre to 2,000 lbs. or more per acre. Where down fuels have accumulated and/or stands are dense the PM 10 production could exceed these estimates. Under this alternative, PM 10 emission levels would not be produced from burning of activity-generated fuels. The No Action Alternative does not provide any opportunities to reduce existing forest fuels and the hazard they pose in wildland fires. During the flaming phase of a catastrophic wildfire, air quality degradation could exceed Federal and State standards as far as 50 miles down wind. Forest fuels would continue to increase with biomass production out-producing the decomposition rates in this climate. Smoke from wildfires would likely impact the city of La Pine.

Alternatives 2 and 3

Pile burning would be conducted in compliance with National Ambient Air Quality Standards and Oregon Department of Forestry Smoke Management regulations and restrictions. Burning would occur during favorable existing and forecasted weather conditions to assure smoke dispersion away from the city of La Pine. Table 22 summarizes the estimated smoke emissions from pile burning in the project area.

Table 22. Estimated smoke emissions from pile burning activities.

		Alternative 1	Alternative 2	Alternative 3
Landing Piles	Tons burned	0	20	17
	Tons/Acre PM10	0.000	0.002	0.002
Hand Piles	Tons burned	0	0	4
	Tons/Acre PM10	0.000	0.000	0.001

Economic and Social

The following summarizes the economic analysis completed for the Long Prairie Mistletoe Reduction project and can be found in the project file.

Economic Efficiency

Forest Service Handbooks 1909.17 and 2409.18 direct the evaluation of Economic Efficiency for proposed projects. To assess economic efficiency of Alternatives 2 and 3, the anticipated timber volumes and costs were entered into TEA.ECON, a spreadsheet developed by the Forest Service to assess economic efficiency. The analysis can be used to compare alternatives, not to give an absolute number for the outputs. Numbers useful for comparing alternatives include a benefit/cost ratio, discounted benefits, discounted costs, and present net value. Effects on the local economy include estimated number of jobs created or maintained.

This analysis does not place a value on indirect benefits which may occur (such as increased future yields resulting from reduced mistletoe levels). Other amenity values, such as dispersed recreation or wildlife habitat, also were not included in the analysis. Table 23 summarizes this analysis.

Alternative 1

Direct and Indirect Effects

With this alternative, no commercial forest products would be provided to the economy. There would be no net sale value, and no additional jobs would be created or maintained. There would be no benefits to the local economy.

Although Alternative 1 would generate no current revenues to returns, there is a cost resulting from the expenditure of planning monies. The Present Net Value (PNV) would be a negative $70,000. Since there are no revenues predicted it is not possible to calculate a benefit/cost ratio.

Alternatives 2 and 3

Direct and Indirect Effects

Factors contributing to differences in the benefit/cost ratio and the present net value for Alternatives 2 and 3 are: 1) the amount of fiber/saw timber proposed for removal, 2) sale preparation costs, 3) cost of soil restoration and associated noxious weed monitoring, and 4) the cost of girdle/prune/fell treatment. Alternative 2 would provide approximately 10 percent more commercial forest products than Alternative 3. Alternative 3 sale preparation costs are approximately 10 percent higher ($8,000) than Alternative 2. The higher sale preparation costs in Alterantive 3 reflect costs associated with identifying trees without mistletoe for retention. The cost associated with the felling/girdling/pruning treatment is the primary factor contributing to Alternative 3 having a lower benefit/cost ratio and present net value than Alternative 2.

Table 23. Summary of economic efficiency analysis.

Economic Measure	Alternative 1 (No Action)	Alternative 2	Alternative 3
Benefits			
Acres of Commercial Harvest	0	8,180 acres	7,335 acres
Volume (Total) Million Board Feet (MMBF) Hundred Cubic Feet (CCF)	 0 0	 5.9 MMBF 11,400 CCF	 5.3 MMBF 10,222 CCF
Discounted Benefits[1]	0	$285,001	$255,347
Costs			
Environmental Analysis	$70,000	$70,000	$70,000
Sale Preparation	----	$8.00/ccf	$8.75/ccf
Subsoiling	----	$45,550	$49,800
Noxious Weed Monitoring	----	$2,500	$2,500
Girdle/Prune/Fell	----	----	$215,400
Discounted Costs[1]	$70,000	$247,843	$253,215
Summary			
Returns to Federal Government (Total Timber Value)		$326,937	$292,919
Benefit/Cost Ratio[1]	----	1.15	1.01
Present Net Value[1]	-$70,000	$37,158	$2,131
Jobs maintained or created[2]	0	57	51
Estimated Employee Income[3]	0	$1,813,227	$1,622,361

[1] Assumes 4% discount rate.

[2] Calculated using figures for the Deschutes National Forest from Appendix B-5 of the FY 1997 Timber Sale Program Annual Report. Excluding firewood from the volume harvested on the Deschutes National Forest, an estimated 9.6 jobs per million board feet were maintained or created.

[3] Derived by multiplying (a) the number of jobs maintained or created by (b) $31,811, the average 1999 salary in Central Oregon for lumber and wood products jobs. Source of salary information: Oregon Covered Employment & Payrolls by County and Industry, Oregon Employment Department, and US Bureau of Labor Statistics.

Cumulative Effects

Over the last 10 years, an annual average of approximately 68.2 MMBF of timber has been sold from the Deschutes National Forest. In the near future, the amount of timber offered for sale is expected to be near this annual average. The Deschutes National Forest is expected to continue offering timber for sale and is expected to continue making contributions to the local economy as a result of timber harvest activities. Timber proposed for harvest with Alternatives 2 and 3 would be approximately 8 to 9 percent of the Forest's annual average timber sale program.

Native Americans, Minority Groups, Women, Civil Rights

There are no known direct, indirect, or cumulative effects on Native Americans, minority groups, women, or civil rights beyond effects disclosed in the Deschutes LRMP.

Environmental Justice

Executive Order 12898 on environmental justice requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects on minority and low-income populations. There were no disproportionately high or

adverse effects to minority or disadvantaged groups qualifying under the environmental justice order identified.

Other Effects and Findings

No old growth stands, Wild and Scenic Rivers or parkland would be adversely affected by the proposed activities. No significant irreversible or irretrievable commitment of resources would occur under Alternative 2 (Proposed Action) or Alternative 3. There would be some negligible irretrievable losses of dust caused by mechanical operations.

Proposed vegetation management activities are consistent with the Record of Decision for the Final Environmental Impact Statement for Managing Competing and Unwanted Vegetation and the subsequent Mediated Agreement of 1989.

The alternatives are consistent with the goals, objectives and direction contained in the Deschutes National forest Land and Resource Management Plan and accompanying Final Environmental Impact Statement and Record of Decision dated August 27, 1990 as amended by the Regional Forester's Forest Plan Amendment #2 (6/95) and Inland Native Fish Strategy.

None of the alternatives establishes a precedent for future actions, nor a decision in principle about a future consideration.

No significant adverse effects to public health or safety have been identified. Harvest activities would not expose the public to an elevated risk of injury. Limiting snag creation within 100 feet of roads would minimize public risk of injury from falling snags.

The effects of implementation of the alternatives are well known, not highly controversial, and do not involve any unique or unknown risks. Effects meet or exceed state water and air quality standards.

Implementation of Alternative 1 (No Action), Alternative 2 (Proposed Action), or Alternative 3 would be consistent with relevant Federal, State and local laws, regulations, and requirements designed for the protection of the environment including the Clean Air and Clean Water Act. None of the alternatives establishes a precedent for future actions or a decision in principle about a future consideration.

NFMA Consistency

The actions proposed with Alternatives 2 and 3 are consistent with the seven vegetative manipulation requirements of 36 CFR 219.27(b).

1) Proposed vegetation treatments are suited to multiple-use goals as established by the Forest Plan. Treatments would move vegetation conditions towards the conditions associated with the General Forest and Scenic Views management allocations.

2) All areas proposed for treatment can be adequately stocked within 5 years of final overstory removal. Within 5 years of final overstory removal, treatment areas would no longer be considered openings.
3) Effects of proposed treatments, including dollar returns to the Government, have been analyzed. Different vegetation treatments proposed in each alternative offer varying dollar returns to the government.
4) Vegetation treatments proposed in Alternatives 2 and 3 were developed to address issues and concerns identified in the purpose and need for action and to meet the desired future conditions outlined in the Forest Plan.
5) In Alternatives 2 and 3, Best Management Practices and timber sale contract specifications that mitigate potential adverse effects would be implemented in all proposed harvest treatments, thus avoiding permanent impairment of site productivity and ensuring conservation of soil resources.
6) All proposed vegetation treatments were designed to meet desired conditions outlined in the Forest Plan for the General Forest and Scenic View allocations.
7) No new permanent roads would be constructed to implement activities proposed in Alternatives 2 and 3. Temporary roads needed during harvest would be obliterated after vegetation management operations were completed. Designated skid trails would be used for logging system design. Ground based harvest systems required for commercial fiber removal is available and consistent with other resource protection.

The actions proposed with Alternatives 2 and 3 are consistent with the silviculture management requirements of 36 CFR 219.27(c). Specifically: no timber harvesting is proposed on lands classified as not suited for timber production.

Consultation and Coordination

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The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

FEDERAL, STATE, AND LOCAL AGENCIES:

Oregon Department of Fish and Wildlife
US Fish and Wildlife Service

TRIBES:

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Confederated Tribes of Warm Springs
The Klamath Tribe

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Appendix 1 – Alternative 2 and 3 Treatment List

Treatment Abbreviations

Harvest (HRVST)

HFR	Final Removal Cut. Removal of overstory trees within a stand with an immature understory that was the result of a prescribed regeneration cut.
None	No commercial harvest.

Treatment (TRTMNT)

Girdle/Prune/Fell	Girdle, prune, or fall and retain mistletoe infected lodgepole or ponderosa pine overstory trees greater than or equal to 4 inches dbh.
LP_All	Remove all live lodgepole pine overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh.
LP_DMT	Remove live lodgepole pine overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh infected with dwarf mistletoe.
LP_Excess	Remove live lodgepole pine overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh excess to green tree replacement strategy.
LP_PP_DMT	Remove live lodgepole and ponderosa pine overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh infected with dwarf mistletoe.
LP_PP_Excess	Remove live lodgepole and ponderosa pine overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh excess to green tree replacement strategy.
PP_DMT	Remove live ponderosa pine overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh infected with dwarf mistletoe.
PP_Excess	Remove live ponderosa pine overstory trees greater than or equal to 4 inches dbh and less than 21 inches dbh excess to green tree replacement strategy.

Green Tree Replacement Strategy (GTR)

3 TPA	Retain 3 trees per acre greater than or equal to 8 inches dbh or the largest tree available.
Clump inside	Within proposed treatment unit, retain clumps of overstory trees that have no dwarf mistletoe infection.
Clump outside	Outside proposed treatment unit, designate areas for retention to provide green tree replacements.
LP GTR	Retain lodgepole pine overstory trees, with or without dwarf mistletoe, to serve as green tree replacements.
PP/WF GTR	Retain ponderosa pine or white fir overstory trees, with or without dwarf mistletoe, to serve as green tree replacements.
Tree w/o dmt	Retain overstory trees that have no dwarf mistletoe to provide tree replacements.

	Alternative 2 (Proposed Action)				Alternative 3			
Unit	**HRVST**	**TRTMNT**	**GTR**	**Acres**	**HRVST**	**TRTMNT**	**GTR**	**Acres**
1					None	Girdle/Prune/Fell	Trees w/o dmt	59
2					None	Girdle/Prune/Fell	Trees w/o dmt	45
3					None	Girdle/Prune/Fell	Trees w/o dmt	85
4					None	Girdle/Prune/Fell	Trees w/o dmt	14
5	HFR	LP_Excess	3 TPA	10	None	Girdle/Prune/Fell	Trees w/o dmt	10
6	HFR	LP_Excess	3 TPA	5	HFR	LP_DMT	Trees w/o dmt	5
7	HFR	LP_Excess	3 TPA	33	HFR	LP_All	PP/WF GTR	33
8					None	Girdle/Prune/Fell	Trees w/o dmt	19
9					None	Girdle/Prune/Fell	Trees w/o dmt	13
10	HFR	LP_PP_Excess	3 TPA	46	None	Girdle/Prune/Fell	Trees w/o dmt	46
11	HFR	LP_Excess	3 TPA	11	HFR	LP_All	PP/WF GTR	11
12	HFR	LP_Excess	3 TPA	90	None	Girdle/Prune/Fell	Trees w/o dmt	90
13	HFR	LP_Excess	3 TPA	72	HFR	LP_Excess	3 TPA	72
14	HFR	LP_Excess	3 TPA	48	None	Girdle/Prune/Fell	Trees w/o dmt	48
15	HFR	LP_Excess	3 TPA	19	HFR	LP_DMT	Trees w/o dmt	19
16					HFR	LP_PP_Excess	3 TPA	25
17	HFR	LP_Excess	3 TPA	32	None	Girdle/Prune/Fell	Trees w/o dmt	32
18					HFR	LP_DMT	Trees w/o dmt	58
19					HFR	LP_All	Clump inside[4]	53
20	HFR	LP_Excess	3 TPA	32	HFR	LP_Excess	3 TPA	32
21	HFR	LP_Excess	3 TPA	35	None	Girdle/Prune/Fell	Trees w/o dmt	35
22					None	Girdle/Prune/Fell	Trees w/o dmt	27
23					None	Girdle/Prune/Fell	Trees w/o dmt	18
24					HFR	LP_PP_Excess	3 TPA	18
25	HFR	LP_Excess	3 TPA	49	HFR	LP_DMT	Trees w/o dmt	49
26	HFR	LP_Excess	3 TPA	48	None	Girdle/Prune/Fell	Trees w/o dmt	48
27					None	Girdle/Prune/Fell	Trees w/o dmt	51
28					None	Girdle/Prune/Fell	Trees w/o dmt	97
29					None	Girdle/Prune/Fell	Trees w/o dmt	4
30	HFR	LP_Excess	3 TPA	84	None	Girdle/Prune/Fell	Trees w/o dmt	84
31	HFR	LP_Excess	3 TPA	21	None	Girdle/Prune/Fell	Trees w/o dmt	21
32	HFR	LP_Excess	3 TPA	75	HFR	LP_All	Clump inside	75
33	HFR	LP_Excess	3 TPA	32	HFR	LP_Excess	3 TPA	32
34					None	Girdle/Prune/Fell	Trees w/o dmt	26
35					None	Girdle/Prune/Fell	Trees w/o dmt	28
36	HFR	LP_Excess	3 TPA	72	HFR	LP_Excess	3 TPA	72
37	HFR	LP_PP_Excess	3 TPA	43	None	Girdle/Prune/Fell	Trees w/o dmt	
38					HFR	LP_PP_DMT	Trees w/o dmt	20
39	HFR	LP_Excess	3 TPA	22	HFR	LP_Excess	3 TPA	22
40					None	Girdle/Prune/Fell	Trees w/o dmt	38

[4] Clumps not mapped. Retain clumps of mistletoe-free overstory (approximately 50% of unit).

	Alternative 2 (Proposed Action)				Alternative 3			
Unit	**HRVST**	**TRTMNT**	**GTR**	**Acres**	**HRVST**	**TRTMNT**	**GTR**	**Acres**
41	HFR	LP_Excess	3 TPA	44	HFR	LP_All	Clump inside	44
42					None	Girdle/Prune/Fell	Trees w/o dmt	18
43	HFR	LP_Excess	3 TPA	41	HFR	LP_All	PP/WF GTR	41
44					None	Girdle/Prune/Fell	Trees w/o dmt	19
45	HFR	LP_Excess	3 TPA	38	HFR	LP_Excess	3 TPA	38
46					HFR	LP_All	PP/WF GTR	44
47	HFR	LP_Excess	3 TPA	28	HFR	LP_Excess	3 TPA	28
48	HFR	LP_Excess	3 TPA	217	HFR	LP_Excess	3 TPA	217
49					HFR	LP_All	Clump inside	52
50					None	Girdle/Prune/Fell	Trees w/o dmt	27
51	HFR	LP_Excess	3 TPA	37	HFR	LP_All	PP/WF GTR	37
52	HFR	LP_Excess	3 TPA	48	HFR	LP_Excess	3 TPA	48
53					None	Girdle/Prune/Fell	Trees w/o dmt	38
54					HFR	LP_PP_Excess	3 TPA	83
55	HFR	LP_Excess	3 TPA	67	HFR	LP_Excess	3 TPA	67
56	HFR	LP_Excess	3 TPA	15	HFR	LP_Excess	3 TPA	15
57	HFR	LP_Excess	3 TPA	12	HFR	LP_Excess	3 TPA	12
58					HFR	LP_All	PP/WF GTR	71
59					HFR	LP_PP_Excess	3 TPA	34
60	HFR	LP_Excess	3 TPA	26	HFR	LP_Excess	3 TPA	26
61	HFR	LP_Excess	3 TPA	43	HFR	LP_All	PP/WF GTR	45
62	HFR	LP_Excess	3 TPA	56	HFR	LP_Excess	3 TPA	56
63	HFR	LP_Excess	3 TPA	7	HFR	LP_All	Clump outside	7
64					None	Girdle/Prune/Fell	Trees w/o dmt	15
65	HFR	LP_Excess	3 TPA	190	HFR	LP_Excess	3 TPA	190
66	HFR	LP_Excess	3 TPA	39	HFR	LP_Excess	3 TPA	39
67	HFR	LP_PP_Excess	3 TPA	9	HFR	LP_PP_Excess	3 TPA	9
69					None	Girdle/Prune/Fell	Trees w/o dmt	32
70	HFR	LP_PP_Excess	3 TPA	16	HFR	LP_PP_Excess	3 TPA	16
71					HFR	LP_Excess	3 TPA	17
72					HFR	LP_Excess	3 TPA	47
73	HFR	LP_Excess	3 TPA	7	HFR	LP_All	Clump outside	7
74					None	Girdle/Prune/Fell	Trees w/o dmt	65
75	HFR	LP_Excess	3 TPA	53	None	Girdle/Prune/Fell	Trees w/o dmt	53
76	HFR	LP_Excess	3 TPA	25	HFR	LP_Excess	3 TPA	25
77					None	Girdle/Prune/Fell	Trees w/o dmt	37
78	HFR	LP_Excess	3 TPA	55	HFR	LP_All	Clump inside	55
79	HFR	LP_Excess	3 TPA	48	HFR	LP_Excess	3 TPA	48
80	HFR	LP_Excess	3 TPA	48	HFR	LP_Excess	3 TPA	48
81	HFR	LP_Excess	3 TPA	76	HFR	LP_Excess	3 TPA	76
82	HFR	LP_Excess	3 TPA	32	HFR	LP_Excess	3 TPA	32
83	HFR	LP_Excess	3 TPA	56	HFR	LP_Excess	3 TPA	56
84	HFR	LP_Excess	3 TPA	171	HFR	LP_Excess	3 TPA	171

	Alternative 2 (Proposed Action)				Alternative 3			
Unit	**HRVST**	**TRTMNT**	**GTR**	**Acres**	**HRVST**	**TRTMNT**	**GTR**	**Acres**
85					None	Girdle/Prune/Fell	Trees w/o dmt	29
86	HFR	LP_Excess	3 TPA	106	HFR	LP_All	Clump inside	106
87	HFR	LP_Excess	3 TPA	20	HFR	LP_Excess	3 TPA	20
88					HFR	LP_Excess	3 TPA	30
89	HFR	LP_Excess	3 TPA	96	None	Girdle/Prune/Fell	Trees w/o dmt	96
90	HFR	LP_Excess	3 TPA	80	None	Girdle/Prune/Fell	Trees w/o dmt	80
91	HFR	LP_Excess	3 TPA	30	HFR	LP_Excess	3 TPA	30
92					HFR	LP_Excess	3 TPA	41
93	HFR	LP_Excess	3 TPA	18	HFR	LP_Excess	3 TPA	18
94	HFR	LP_Excess	3 TPA	46	HFR	LP_Excess	3 TPA	46
95	HFR	LP_Excess	3 TPA	38	HFR	LP_Excess	3 TPA	38
96	HFR	LP_PP_Excess	3 TPA	45	HFR	LP_PP_Excess	3 TPA	45
97	HFR	LP_Excess	3 TPA	11	HFR	LP_All	PP/WF GTR	11
98	HFR	LP_Excess	3 TPA	26	HFR	LP_Excess	3 TPA	26
99					HFR	LP_PP_Excess	3 TPA	38
100	HFR	LP_PP_Excess	3 TPA	182	None	Girdle/Prune/Fell	Trees w/o dmt	182
101					HFR	LP_PP_Excess	3 TPA	21
102	HFR	LP_Excess	3 TPA	17	HFR	LP_All	PP/WF GTR	17
103	HFR	LP_PP_Excess	3 TPA	60	HFR	LP_PP_Excess	3 TPA	60
104	HFR	LP_PP_Excess	3 TPA	16	HFR	LP_PP_Excess	3 TPA	16
105	HFR	LP_Excess	3 TPA	80	None	Girdle/Prune/Fell	Trees w/o dmt	80
106	HFR	LP_Excess	3 TPA	193	HFR	LP_All	Clump inside	193
107	HFR	LP_PP_Excess	3 TPA	74	None	Girdle/Prune/Fell	Trees w/o dmt	74
108					HFR	PP_DMT	LP GTR	24
109					HFR	LP_PP_Excess	3 TPA	6
110	HFR	LP_PP_Excess	3 TPA	33	None	Girdle/Prune/Fell	Trees w/o dmt	33
111					HFR	LP_PP_Excess	3 TPA	23
112					None	Girdle/Prune/Fell	Trees w/o dmt	19
113	HFR	LP_Excess	3 TPA	68	HFR	LP_Excess	3 TPA	68
114					HFR	LP_PP_Excess	3 TPA	12
115					None	Girdle/Prune/Fell	Trees w/o dmt	9
116	HFR	LP_Excess	3 TPA	16	HFR	LP_Excess	3 TPA	16
117					None	Girdle/Prune/Fell	Trees w/o dmt	27
118	HFR	LP_Excess	3 TPA	48	HFR	LP_Excess	3 TPA	48
119	HFR	LP_Excess	3 TPA	5	HFR	LP_Excess	3 TPA	5
120	HFR	LP_Excess	3 TPA	8	HFR	LP_Excess	3 TPA	8
121	HFR	LP_PP_Excess	3 TPA	87	HFR	LP_PP_Excess	3 TPA	87
122	HFR	LP_PP_Excess	3 TPA	50	HFR	LP_PP_Excess	3 TPA	50
123	HFR	LP_Excess	3 TPA	15	HFR	LP_All	PP/WF GTR	15
125	HFR	LP_Excess	3 TPA	31	HFR	LP_Excess	3 TPA	31
126	HFR	LP_Excess	3 TPA	39	HFR	LP_Excess	3 TPA	39
127					None	Girdle/Prune/Fell	Trees w/o dmt	14
128	HFR	LP_Excess	3 TPA	46	HFR	LP_Excess	3 TPA	46

	Alternative 2 (Proposed Action)				Alternative 3			
Unit	**HRVST**	**TRTMNT**	**GTR**	**Acres**	**HRVST**	**TRTMNT**	**GTR**	**Acres**
129	HFR	LP_PP_Excess	3 TPA	105	HFR	LP_PP_Excess	3 TPA	105
130	HFR	LP_Excess	3 TPA	17	HFR	LP_All	Clump outside	17
131	HFR	LP_Excess	3 TPA	10	HFR	LP_Excess	3 TPA	10
132	HFR	LP_Excess	3 TPA	20	HFR	LP_All	Clump inside	20
133	HFR	LP_Excess	3 TPA	31	HFR	LP_Excess	3 TPA	31
134					None	Girdle/Prune/Fell	Trees w/o dmt	26
135	HFR	LP_Excess	3 TPA	55	HFR	LP_Excess	3 TPA	55
136	HFR	LP_Excess	3 TPA	31	None	Girdle/Prune/Fell	Trees w/o dmt	31
137	HFR	LP_Excess	3 TPA	23	HFR	LP_All	PP/WF GTR	23
138	HFR	LP_Excess	3 TPA	35	HFR	LP_Excess	3 TPA	35
139	HFR	LP_Excess	3 TPA	53	HFR	LP_Excess	3 TPA	53
141					HFR	LP_All	Clump inside	36
142	HFR	LP_Excess	3 TPA	52	HFR	LP_Excess	3 TPA	52
143	HFR	LP_Excess	3 TPA	19	HFR	LP_Excess	3 TPA	19
144	HFR	LP_Excess	3 TPA	95	HFR	LP_Excess	3 TPA	95
145	HFR	LP_Excess	3 TPA	38	HFR	LP_All	PP/WF GTR	38
146	HFR	LP_Excess	3 TPA	44	HFR	LP_Excess	3 TPA	44
147	HFR	LP_Excess	3 TPA	29	HFR	LP_DMT	Trees w/o dmt	29
148	HFR	LP_Excess	3 TPA	39	HFR	LP_Excess	3 TPA	39
149					HFR	LP_DMT	Trees w/o dmt	31
150					HFR	LP_PP_Excess	3 TPA	47
151	HFR	LP_Excess	3 TPA	39	HFR	LP_Excess	3 TPA	39
152	HFR	LP_Excess	3 TPA	8	HFR	LP_Excess	3 TPA	8
153	HFR	LP_Excess	3 TPA	13	HFR	LP_All	PP/WF GTR	13
154					HFR	LP_All	Clump inside	77
155					HFR	LP_Excess	3 TPA	10
156	HFR	LP_Excess	3 TPA	36	HFR	LP_Excess	3 TPA	36
157					None	Girdle/Prune/Fell	Trees w/o dmt	25
158	HFR	PP_Excess	3 TPA	18	None	Girdle/Prune/Fell	Trees w/o dmt	18
159	HFR	LP_Excess	3 TPA	122	HFR	LP_All	Clump inside	122
160	HFR	LP_Excess	3 TPA	50	None	Girdle/Prune/Fell	Trees w/o dmt	50
161	HFR	LP_Excess	3 TPA	17	None	Girdle/Prune/Fell	Trees w/o dmt	17
162	HFR	LP_Excess	3 TPA	44	HFR	LP_Excess	3 TPA	44
163	HFR	LP_PP_Excess	3 TPA	64	HFR	LP_PP_Excess	3 TPA	64
164					HFR	LP_PP_Excess	3 TPA	84
165	HFR	LP_Excess	3 TPA	19	HFR	LP_All	Clump inside	19
166	HFR	LP_Excess	3 TPA	55	HFR	LP_Excess	3 TPA	55
167	HFR	LP_Excess	3 TPA	33	HFR	LP_All	Clump inside	31
168	HFR	LP_Excess	3 TPA	24	HFR	LP_All	PP/WF GTR	26
169					None	Girdle/Prune/Fell	Trees w/o dmt	10
170	HFR	LP_Excess	3 TPA	13	HFR	LP_All	PP/WF GTR	13
171	HFR	LP_Excess	3 TPA	34	HFR	LP_All	Clump inside	34
172					None	Girdle/Prune/Fell	Trees w/o dmt	18

	Alternative 2 (Proposed Action)				Alternative 3			
Unit	**HRVST**	**TRTMNT**	**GTR**	**Acres**	**HRVST**	**TRTMNT**	**GTR**	**Acres**
173	HFR	LP_Excess	3 TPA	15	None	Girdle/Prune/Fell	Trees w/o dmt	15
174	HFR	LP_Excess	3 TPA	14	None	Girdle/Prune/Fell	Trees w/o dmt	14
175					HFR	LP_All	Clump outside	10
176	HFR	LP_Excess	3 TPA	16	None	Girdle/Prune/Fell	Trees w/o dmt	16
177	HFR	LP_Excess	3 TPA	60	HFR	LP_Excess	3 TPA	60
178	HFR	LP_Excess	3 TPA	38	HFR	LP_Excess	3 TPA	38
179	HFR	LP_Excess	3 TPA	17	HFR	LP_Excess	3 TPA	17
180	HFR	LP_Excess	3 TPA	14	None	Girdle/Prune/Fell	Trees w/o dmt	14
181	HFR	LP_Excess	3 TPA	39	HFR	LP_Excess	3 TPA	39
182	HFR	LP_Excess	3 TPA	23	HFR	LP_Excess	3 TPA	23
183	HFR	LP_Excess	3 TPA	53	HFR	LP_All	Clump inside	53
184					None	Girdle/Prune/Fell	Trees w/o dmt	16
185	HFR	LP_Excess	3 TPA	35	HFR	LP_All	Clump inside	35
186	HFR	LP_Excess	3 TPA	12	HFR	LP_Excess	3 TPA	12
187	HFR	LP_Excess	3 TPA	27	None	Girdle/Prune/Fell	Trees w/o dmt	
188	HFR	LP_Excess	3 TPA	134	HFR	LP_Excess	3 TPA	134
189	HFR	LP_Excess	3 TPA	31	None	Girdle/Prune/Fell	Trees w/o dmt	31
190	HFR	LP_Excess	3 TPA	42	HFR	LP_Excess	3 TPA	42
191	HFR	LP_PP_Excess	3 TPA	36	HFR	LP_PP_Excess	3 TPA	36
192					None	Girdle/Prune/Fell	Trees w/o dmt	14
193	HFR	LP_Excess	3 TPA	26	HFR	LP_All	Clump inside[5]	26
194	HFR	LP_Excess	3 TPA	13	HFR	LP_Excess	3 TPA	13
195	HFR	LP_Excess	3 TPA	48	HFR	LP_Excess	3 TPA	48
196	HFR	LP_Excess	3 TPA	14	HFR	LP_Excess	3 TPA	14
197	HFR	LP_Excess	3 TPA	36	HFR	LP_All	Clump inside	36
198	HFR	LP_Excess	3 TPA	34	None	Girdle/Prune/Fell	Trees w/o dmt	34
199					None	Girdle/Prune/Fell	Trees w/o dmt	39
200	HFR	LP_Excess	3 TPA	23	HFR	LP_Excess	3 TPA	23
201					HFR	LP_Excess	3 TPA	15
202	HFR	LP_Excess	3 TPA	45	HFR	LP_All	PP/WF GTR	45
203	HFR	LP_Excess	3 TPA	3	HFR	LP_Excess	3 TPA	3
204	HFR	LP_Excess	3 TPA	32	HFR	LP_Excess	3 TPA	32
205	HFR	LP_Excess	3 TPA	7	HFR	LP_Excess	3 TPA	7
206	HFR	LP_Excess	3 TPA	242	HFR	LP_DMT	Trees w/o dmt	242
207					None	Girdle/Prune/Fell	Trees w/o dmt	44
208	HFR	LP_Excess	3 TPA	22	HFR	LP_DMT	Trees w/o dmt	22
209	HFR	LP_Excess	3 TPA	40	None	Girdle/Prune/Fell	Trees w/o dmt	40
210	HFR	LP_Excess	3 TPA	48	HFR	LP_All	PP/WF GTR	48
211					None	Girdle/Prune/Fell	Trees w/o dmt	5
212					None	Girdle/Prune/Fell	Trees w/o dmt	36
213	HFR	LP_Excess	3 TPA	15	HFR	LP_Excess	3 TPA	15

[5] Clumps not mapped. Retain clumps of mistletoe-free overstory (approximately 30% of unit).

	Alternative 2 (Proposed Action)				Alternative 3			
Unit	**HRVST**	**TRTMNT**	**GTR**	**Acres**	**HRVST**	**TRTMNT**	**GTR**	**Acres**
214	HFR	LP_Excess	3 TPA	10	HFR	LP_Excess	3 TPA	10
215	HFR	LP_Excess	3 TPA	26	None	Girdle/Prune/Fell	Trees w/o dmt	26
216	HFR	LP_Excess	3 TPA	14	None	Girdle/Prune/Fell	Trees w/o dmt	14
217	HFR	LP_PP_Excess	3 TPA	48	HFR	LP_PP_Excess	3 TPA	48
218	HFR	LP_Excess	3 TPA	51	HFR	LP_DMT	Trees w/o dmt	51
219	HFR	LP_Excess	3 TPA	19	None	Girdle/Prune/Fell	Trees w/o dmt	19
220	HFR	LP_Excess	3 TPA	38	None	Girdle/Prune/Fell	Trees w/o dmt	38
221	HFR	LP_Excess	3 TPA	32	HFR	LP_Excess	3 TPA	32
222	HFR	LP_Excess	3 TPA	24	None	Girdle/Prune/Fell	Trees w/o dmt	24
223	HFR	LP_Excess	3 TPA	38	None	Girdle/Prune/Fell	Trees w/o dmt	
224					None	Girdle/Prune/Fell	Trees w/o dmt	57
225	HFR	LP_Excess	3 TPA	12	HFR	LP_DMT	Trees w/o dmt	12
226	HFR	LP_Excess	3 TPA	39	None	Girdle/Prune/Fell	Trees w/o dmt	39
227	HFR	LP_Excess	3 TPA	15	HFR	LP_Excess	3 TPA	15
228	HFR	LP_Excess	3 TPA	13	HFR	LP_Excess	3 TPA	13
229	HFR	LP_Excess	3 TPA	19	HFR	LP_Excess	3 TPA	19
230	HFR	LP_Excess	3 TPA	24	HFR	LP_Excess	3 TPA	24
231	HFR	LP_Excess	3 TPA	45	HFR	LP_Excess	3 TPA	45
232	HFR	LP_Excess	3 TPA	40	HFR	LP_Excess	3 TPA	40
233					None	Girdle/Prune/Fell	Trees w/o dmt	22
234	HFR	LP_Excess	3 TPA	10	HFR	LP_Excess	3 TPA	10
235					None	Girdle/Prune/Fell	Trees w/o dmt	104
236					None	Girdle/Prune/Fell	Trees w/o dmt	47
237					HFR	LP_PP_Excess	3 TPA	119
238	HFR	LP_Excess	3 TPA	10	None	Girdle/Prune/Fell	Trees w/o dmt	10
239	HFR	LP_Excess	3 TPA	14	None	Girdle/Prune/Fell	Trees w/o dmt	14
240	HFR	LP_Excess	3 TPA	34	HFR	LP_All	Clump inside	34
241	HFR	LP_Excess	3 TPA	21	HFR	LP_Excess	3 TPA	21
242	HFR	LP_Excess	3 TPA	41	HFR	LP_Excess	3 TPA	41
243	HFR	LP_Excess	3 TPA	28	HFR	LP_DMT	Trees w/o dmt	28
244					None	Girdle/Prune/Fell	Trees w/o dmt	64
245	HFR	LP_Excess	3 TPA	39	HFR	LP_Excess	3 TPA	39
246					None	Girdle/Prune/Fell	Trees w/o dmt	130
247	HFR	LP_Excess	3 TPA	28	HFR	LP_Excess	3 TPA	28
248	HFR	LP_Excess	3 TPA	25	HFR	LP_Excess	3 TPA	25
249	HFR	LP_Excess	3 TPA	44	HFR	LP_All	Clump outside	44
250	HFR	LP_Excess	3 TPA	27	HFR	LP_All	Clump inside	27
252					None	Girdle/Prune/Fell	Trees w/o dmt	26
253					None	Girdle/Prune/Fell	Trees w/o dmt	34
254	HFR	LP_Excess	3 TPA	44	HFR	LP_Excess	3 TPA	44
255	HFR	LP_Excess	3 TPA	9	HFR	LP_All	Clump inside	9
256	HFR	LP_Excess	3 TPA	6	HFR	LP_Excess	3 TPA	6
257					HFR	LP_PP_Excess	3 TPA	56

	Alternative 2 (Proposed Action)				Alternative 3			
Unit	**HRVST**	**TRTMNT**	**GTR**	**Acres**	**HRVST**	**TRTMNT**	**GTR**	**Acres**
258					HFR	LP_Excess	3 TPA	127
259	HFR	LP_Excess	3 TPA	34	None	Girdle/Prune/Fell	Trees w/o dmt	34
260					HFR	LP_PP_Excess	3 TPA	93
261	HFR	LP_Excess	3 TPA	11	HFR	LP_Excess	3 TPA	11
262	HFR	LP_Excess	3 TPA	10	HFR	LP_All	Clump inside	10
263					None	Girdle/Prune/Fell	Trees w/o dmt	15
264	HFR	LP_Excess	3 TPA	64	HFR	LP_All	PP/WF GTR	64
265	HFR	LP_Excess	3 TPA	86	HFR	LP_Excess	3 TPA	86
266	HFR	LP_Excess	3 TPA	14	HFR	LP_Excess	3 TPA	14
267	HFR	LP_Excess	3 TPA	21	HFR	LP_All	Clump inside	21
269					None	Girdle/Prune/Fell	Trees w/o dmt	33
270					HFR	LP_Excess	3 TPA	35
271	HFR	LP_Excess	3 TPA	22	HFR	LP_All	PP/WF GTR	22
272					None	Girdle/Prune/Fell	Trees w/o dmt	40
273					None	Girdle/Prune/Fell	Trees w/o dmt	70
274					HFR	LP_DMT	Trees w/o dmt	15
275	HFR	LP_Excess	3 TPA	6	None	Girdle/Prune/Fell	Trees w/o dmt	6
276	HFR	LP_Excess	3 TPA	28	HFR	LP_All	Clump outside	28
277	HFR	LP_Excess	3 TPA	24	None	Girdle/Prune/Fell	Trees w/o dmt	24
278					HFR	LP_All	Clump outside	16
279					HFR	LP_PP_Excess	3 TPA	10
280	HFR	LP_Excess	3 TPA	5	None	Girdle/Prune/Fell	Trees w/o dmt	5
281					None	Girdle/Prune/Fell	Trees w/o dmt	31
282	HFR	LP_Excess	3 TPA	32	HFR	LP_All	PP/WF GTR	32
283	HFR	LP_PP_Excess	3 TPA	31	HFR	LP_PP_Excess	3 TPA	39
284					HFR	LP_Excess	3 TPA	9
285	HFR	LP_Excess	3 TPA	3	HFR	LP_Excess	3 TPA	3
286	HFR	LP_PP_Excess	3 TPA	74	HFR	LP_PP_Excess	3 TPA	74
287					None	Girdle/Prune/Fell	Trees w/o dmt	37
288	HFR	LP_Excess	3 TPA	15	HFR	LP_Excess	3 TPA	15
290	HFR	LP_Excess	3 TPA	30	HFR	LP_Excess	3 TPA	30
291	HFR	LP_Excess	3 TPA	14	HFR	LP_Excess	3 TPA	14
292	HFR	LP_Excess	3 TPA	29	HFR	LP_Excess	3 TPA	29
293	HFR	LP_Excess	3 TPA	27	HFR	LP_Excess	3 TPA	27
294	HFR	LP_Excess	3 TPA	24	HFR	LP_Excess	3 TPA	24
295	HFR	LP_Excess	3 TPA	108	None	Girdle/Prune/Fell	Trees w/o dmt	108
296	HFR	LP_PP_Excess	3 TPA	71	None	Girdle/Prune/Fell	Trees w/o dmt	71
297					None	Girdle/Prune/Fell	Trees w/o dmt	50
298	HFR	LP_Excess	3 TPA	9	HFR	LP_All	Clump outside	9

Appendix 2 - Estimates of Detrimental Soil Disturbance from Mechanical Treatments by Activity Areas (Units) and Action Alternatives.

EA Unit/Stand Number	Proposed Activity HFR = Final Removal Cut		Treated Acres	Unit Acres	Percent Treated	Existing Detrimental Soil Conditions (%)	Estimated Detrimental Soil Conditions After Treatment (%)		Estimated Detrimental Soil Conditions After Restoration (%/Acres)			
	Alt 2	Alt 3					Alt 2	Alt 3	Alt 2		Alt 3	
5	HFR		10	10	100%	17%	24%	17%	17%	0.7	17%	0.0
6	HFR	HFR	5	5	100%	23%	30%	30%	20%	0.5	20%	0.5
7	HFR	HFR	33	33	100%	14%	21%	21%	20%	0.3	20%	0.3
10	HFR		46	46	100%	24%	31%	24%	24%	5.1	24%	0.0
11	HFR	HFR	11	11	100%	17%	24%	24%	17%	0.7	17%	0.7
12	HFR		90	90	100%	29%	36%	29%	27%	14.4	29%	0.0
13	HFR	HFR	72	72	100%	29%	36%	36%	27%	6.0	27%	6.0
14	HFR		48	48	100%	16%	23%	16%	16%	3.3	16%	0.0
15	HFR	HFR	19	19	100%	8%	15%	15%	15%	0.0	15%	0.0
16		HFR	27	27	100%	30%	30%	37%	30%	0.0	28%	2.4
17	HFR		32	32	100%	13%	20%	13%	20%	0.0	13%	0.0
18		HFR	58	58	100%	24%	24%	31%	24%	0.0	22%	5.2
19		HFR	27	53	50%	23%	23%	26%	23%	0.0	20%	3.2
20	HFR	HFR	32	32	100%	13%	20%	20%	20%	0.0	20%	0.0
21	HFR		35	35	100%	15%	22%	15%	20%	0.7	15%	0.0
24		HFR	18	18	100%	30%	30%	37%	30%	0.0	25%	2.2
25	HFR	HFR	49	49	100%	25%	32%	32%	23%	4.4	23%	4.4
26	HFR		48	48	100%	29%	36%	29%	27%	4.3	29%	0.0
30	HFR		84	84	100%	8%	15%	8%	15%	0.0	8%	0.0
31	HFR		21	21	100%	13%	20%	13%	20%	0.0	13%	0.0
32	HFR	HFR	75	75	100%	13%	14%	14%	14%	0.0	14%	0.0
33	HFR	HFR	32	32	100%	13%	20%	20%	20%	0.0	20%	0.0
36	HFR	HFR	71	71	100%	13%	20%	20%	20%	0.0	20%	0.0
37	HFR		43	43	100%	24%	31%	24%	22%	3.8	24%	0.0
38		HFR	20	20	100%	30%	30%	37%	30%	0.0	28%	1.8
39	HFR	HFR	22	22	100%	29%	36%	36%	27%	2.0	27%	2.0
41	HFR	HFR	15	44	34%	29%	31%	31%	29%	0.8	29%	0.8
43	HFR	HFR	41	41	100%	14%	21%	21%	20%	0.4	20%	0.4
45	HFR	HFR	38	38	100%	29%	36%	36%	27%	3.4	27%	3.4
46		HFR	44	44	100%	23%	23%	30%	23%	0.0	23%	3.1
47	HFR	HFR	28	28	100%	25%	32%	32%	23%	2.6	23%	2.6
48	HFR	HFR	217	217	100%	17%	24%	24%	20%	8.7	20%	8.7
49		HFR	29	52	56%	30%	30%	34%	30%	0.0	28%	3.1
51	HFR	HFR	37	37	100%	14%	21%	21%	17%	1.5	17%	1.5
52	HFR	HFR	48	48	100%	30%	37%	37%	28%	4.4	28%	4.4
54		HFR	83	83	100%	24%	24%	31%	24%	0.0	24%	5.8
55	HFR	HFR	67	67	100%	30%	37%	37%	28%	6.0	28%	6.0
56	HFR	HFR	15	15	100%	16%	23%	23%	16%	1.1	16%	1.1
57	HFR	HFR	12	12	100%	21%	28%	28%	20%	1.0	20%	1.0
58		HFR	71	71	100%	17%	17%	24%	17%	0.0	20%	2.8
59		HFR	34	34	100%	30%	30%	37%	30%	0.0	28%	3.1

EA Unit/Stand Number	Proposed Activity HFR = Final Removal Cut		Treated Acres	Unit Acres	Percent Treated	Existing Detrimental Soil Conditions (%)	Estimated Detrimental Soil Conditions After Treatment (%)		Estimated Detrimental Soil Conditions After Restoration (%/Acres)			
	Alt 2	Alt 3					Alt 2	Alt 3	Alt 2		Alt 3	
60	HFR	HFR	26	26	100%	23%	30%	30%	20%	2.6	20%	2.6
61	HFR	HFR	45	45	100%	19%	26%	26%	19%	3.1	19%	3.1
62	HFR	HFR	56	56	100%	30%	37%	37%	28%	5.0	28%	5.0
63	HFR	HFR	7	7	100%	30%	37%	37%	28%	0.6	28%	0.6
65	HFR	HFR	190	190	100%	17%	24%	24%	20%	7.6	20%	7.6
66	HFR	HFR	39	39	100%	30%	37%	37%	28%	3.5	28%	3.5
67	HFR	HFR	9	9	100%	26%	33%	33%	24%	0.8	24%	0.8
70	HFR	HFR	16	16	100%	13%	20%	20%	20%	0.0	20%	0.0
71		HFR	17	17	100%	31%	31%	38%	31%	0.0	30%	1.4
72		HFR	47	47	100%	23%	23%	30%	23%	0.0	23%	3.3
73	HFR	HFR	7	7	100%	8%	15%	15%	15%	0.0	15%	0.0
75	HFR		53	53	100%	30%	37%	30%	28%	4.8	30%	0.0
76	HFR	HFR	25	25	100%	13%	20%	20%	20%	0.0	20%	0.0
78	HFR	HFR	47	55	85%	19%	25%	25%	19%	3.3	19%	3.3
79	HFR	HFR	48	48	100%	19%	26%	26%	19%	3.4	19%	3.4
80	HFR	HFR	48	48	100%	18%	25%	25%	18%	3.4	18%	3.4
81	HFR	HFR	76	76	100%	14%	21%	21%	19%	1.6	19%	1.6
82	HFR	HFR	32	32	100%	24%	31%	31%	22%	2.9	22%	2.9
83	HFR	HFR	56	56	100%	25%	32%	32%	23%	5.0	23%	5.0
84	HFR	HFR	171	171	100%	30%	37%	37%	30%	12.0	30%	12.0
86	HFR	HFR	77	106	73%	8%	13%	13%	13%	0.0	13%	0.0
87	HFR	HFR	20	20	100%	20%	27%	27%	20%	1.4	20%	1.4
88		HFR	30	30	100%	24%	24%	31%	24%	0.0	22%	2.7
89	HFR		96	96	100%	13%	20%	13%	20%	0.0	13%	0.0
90	HFR		80	80	100%	13%	20%	13%	20%	0.0	13%	0.0
91	HFR	HFR	30	30	100%	24%	31%	31%	22%	2.7	22%	2.7
92		HFR	41	41	100%	31%	31%	38%	31%	0.0	30%	3.3
93	HFR	HFR	18	18	100%	20%	27%	27%	19%	1.5	19%	1.5
94	HFR	HFR	46	46	100%	15%	22%	22%	15%	3.2	15%	3.2
95	HFR	HFR	38	38	100%	30%	37%	37%	28%	3.5	28%	3.5
96	HFR	HFR	45	45	100%	18%	25%	25%	20%	2.3	20%	2.3
97	HFR	HFR	11	11	100%	27%	34%	34%	20%	1.5	20%	1.5
98	HFR	HFR	26	26	100%	20%	27%	27%	20%	1.8	20%	1.8
99		HFR	38	38	100%	24%	24%	31%	24%	0.0	22%	3.4
100	HFR		182	182	100%	13%	20%	13%	20%	0.0	13%	0.0
101		HFR	21	21	100%	32%	32%	39%	32%	0.0	32%	1.5
102	HFR	HFR	17	17	100%	24%	31%	31%	20%	1.9	20%	1.9
103	HFR	HFR	60	60	100%	25%	32%	32%	23%	5.4	23%	5.4
104	HFR	HFR	16	16	100%	9%	16%	16%	16%	0.0	16%	0.0
105	HFR		80	80	100%	14%	21%	14%	19%	1.6	14%	0.0
106	HFR	HFR	171	193	89%	9%	15%	15%	15%	0.0	15%	0.0
107	HFR		74	74	100%	24%	31%	24%	22%	6.6	24%	0.0
108		HFR	24	24	100%	29%	29%	36%	29%	0.0	27%	2.1
109		HFR	6	6	100%	29%	29%	36%	29%	0.0	20%	1.0
110	HFR		33	33	100%	13%	20%	13%	20%	0.0	13%	0.0

EA Unit/Stand Number	Proposed Activity HFR = Final Removal Cut		Treated Acres	Unit Acres	Percent Treated	Existing Detrimental Soil Conditions (%)	Estimated Detrimental Soil Conditions After Treatment (%)		Estimated Detrimental Soil Conditions After Restoration (%/Acres)			
	Alt 2	Alt 3					Alt 2	Alt 3	Alt 2		Alt 3	
111		HFR	23	23	100%	31%	31%	38%	31%	0.0	30%	1.8
113	HFR	HFR	68	68	100%	30%	37%	37%	29%	5.5	29%	5.5
114		HFR	12	12	100%	30%	30%	37%	30%	0.0	25%	1.4
116	HFR	HFR	16	16	100%	23%	30%	30%	20%	1.6	20%	1.6
118	HFR	HFR	48	48	100%	26%	33%	33%	24%	4.3	24%	4.3
119	HFR	HFR	5	5	100%	35%	42%	42%	20%	1.1	20%	1.1
120	HFR	HFR	8	8	100%	23%	30%	30%	20%	0.8	20%	0.8
121	HFR	HFR	87	87	100%	25%	32%	32%	25%	6.0	25%	6.0
122	HFR	HFR	50	50	100%	25%	32%	32%	23%	4.5	23%	4.5
123	HFR	HFR	15	15	100%	25%	32%	32%	20%	1.8	20%	1.8
125	HFR	HFR	31	31	100%	8%	15%	15%	15%	0.0	15%	0.0
126	HFR	HFR	39	39	100%	14%	21%	21%	15%	2.3	15%	2.3
128	HFR	HFR	46	46	100%	15%	22%	22%	17%	2.3	17%	2.3
129	HFR	HFR	105	105	100%	13%	20%	20%	20%	0.0	20%	0.0
130	HFR	HFR	17	17	100%	27%	34%	34%	25%	1.5	25%	1.5
131	HFR	HFR	10	10	100%	29%	36%	36%	25%	1.1	25%	1.1
132	HFR	HFR	15	20	75%	9%	14%	14%	14%	0.0	14%	0.0
133	HFR	HFR	31	31	100%	29%	36%	36%	27%	2.8	27%	2.8
135	HFR	HFR	55	55	100%	15%	22%	22%	20%	1.0	20%	1.0
136	HFR		31	31	100%	29%	36%	29%	27%	2.8	29%	0.0
137	HFR	HFR	23	23	100%	25%	32%	32%	23%	2.1	23%	2.1
138	HFR	HFR	35	35	100%	24%	31%	31%	22%	3.2	22%	3.2
139	HFR	HFR	53	53	100%	15%	22%	22%	20%	1.1	20%	1.1
141		HFR	15	36	42%	25%	25%	28%	25%	0.0	23%	1.8
142	HFR	HFR	52	52	100%	25%	32%	32%	23%	4.6	23%	4.6
143	HFR	HFR	19	19	100%	14%	21%	21%	18%	0.6	18%	0.6
144	HFR	HFR	95	95	100%	14%	21%	21%	20%	1.0	20%	1.0
145	HFR	HFR	38	38	100%	15%	22%	22%	18%	1.6	18%	1.6
146	HFR	HFR	44	44	100%	14%	21%	21%	18%	1.3	18%	1.3
147	HFR	HFR	29	29	100%	30%	37%	37%	28%	2.6	28%	2.6
148	HFR	HFR	39	39	100%	29%	36%	36%	28%	3.1	28%	3.1
149		HFR	33	33	100%	31%	31%	38%	31%	0.0	30%	2.6
150		HFR	47	47	100%	24%	24%	31%	24%	0.0	23%	3.8
151	HFR	HFR	39	39	100%	13%	20%	20%	20%	0.0	20%	0.0
152	HFR	HFR	8	8	100%	13%	20%	20%	20%	0.0	20%	0.0
153	HFR	HFR	13	13	100%	13%	20%	20%	20%	0.0	20%	0.0
154		HFR	73	77	95%	23%	23%	30%	23%	0.0	23%	5.4
155		HFR	10	10	100%	31%	31%	38%	31%	0.0	25%	1.3
156	HFR	HFR	36	36	100%	15%	22%	22%	18%	1.4	18%	1.4
158	HFR		18	18	100%	13%	20%	13%	20%	0.0	13%	0.0
159	HFR	HFR	17	122	14%	14%	15%	15%	15%	0.0	15%	0.0
160	HFR		50	50	100%	32%	39%	32%	30%	4.5	32%	0.0
161	HFR		17	17	100%	14%	21%	14%	14%	1.2	14%	0.0
162	HFR	HFR	44	44	100%	29%	36%	36%	27%	3.9	27%	3.9
163	HFR	HFR	64	64	100%	30%	37%	37%	28%	5.8	28%	5.8

EA Unit/Stand Number	Proposed Activity HFR = Final Removal Cut		Treated Acres	Unit Acres	Percent Treated	Existing Detrimental Soil Conditions (%)	Estimated Detrimental Soil Conditions After Treatment (%)		Estimated Detrimental Soil Conditions After Restoration (%/Acres)			
	Alt 2	Alt 3					Alt 2	Alt 3	Alt 2		Alt 3	
164		HFR	84	84	100%	23%	23%	30%	23%	0.0	23%	5.9
165	HFR	HFR	13	19	68%	30%	35%	35%	28%	1.4	28%	1.4
166	HFR	HFR	55	55	100%	14%	21%	21%	19%	1.1	19%	1.1
167	HFR	HFR	21	33	64%	13%	17%	17%	17%	0.0	17%	0.0
168	HFR	HFR	26	26	100%	14%	21%	21%	15%	1.6	15%	1.6
170	HFR	HFR	13	13	100%	16%	23%	23%	16%	0.9	16%	0.9
171	HFR		1	34	3%	14%	14%	14%	14%	0.0	14%	0.0
173	HFR		15	15	100%	30%	37%	30%	25%	1.8	30%	0.0
174	HFR		28	28	100%	14%	21%	14%	18%	0.9	14%	0.0
175		HFR	10	10	100%	26%	26%	33%	26%	0.0	23%	1.0
176	HFR		16	16	100%	24%	31%	24%	22%	1.5	24%	0.0
177	HFR	HFR	60	60	100%	16%	23%	23%	18%	3.0	18%	3.0
178	HFR	HFR	38	38	100%	25%	32%	32%	23%	3.5	23%	3.5
179	HFR	HFR	17	17	100%	29%	36%	36%	25%	1.8	25%	1.8
180	HFR		14	14	100%	24%	31%	24%	22%	1.2	24%	0.0
181	HFR	HFR	39	39	100%	13%	20%	20%	20%	0.0	20%	0.0
182	HFR	HFR	23	23	100%	32%	39%	39%	30%	2.1	30%	2.1
183	HFR	HFR	26	53	49%	14%	17%	17%	17%	0.0	17%	0.0
185	HFR	HFR	6	35	17%	24%	25%	25%	23%	0.7	23%	0.7
186	HFR	HFR	12	12	100%	13%	20%	20%	20%	0.0	20%	0.0
187	HFR		27	27	100%	13%	20%	13%	20%	0.0	13%	0.0
188	HFR	HFR	134	134	100%	14%	21%	21%	20%	1.3	20%	1.3
189	HFR		31	31	100%	14%	21%	14%	18%	0.9	14%	0.0
190	HFR	HFR	42	42	100%	25%	32%	32%	23%	3.7	23%	3.7
191	HFR	HFR	36	36	100%	14%	21%	21%	18%	1.1	18%	1.1
193	HFR	HFR	18	26	69%	13%	18%	18%	18%	0.0	18%	0.0
194	HFR	HFR	13	13	100%	30%	37%	37%	25%	1.5	25%	1.5
195	HFR	HFR	48	48	100%	29%	36%	36%	27%	4.3	27%	4.3
196	HFR	HFR	14	14	100%	31%	38%	38%	25%	1.8	25%	1.8
197	HFR	HFR	9	36	25%	14%	16%	16%	16%	0.0	16%	0.0
198	HFR		34	34	100%	13%	20%	13%	20%	0.0	13%	0.0
200	HFR	HFR	23	23	100%	30%	37%	37%	28%	2.1	28%	2.1
201		HFR	15	15	100%	30%	30%	37%	30%	0.0	25%	1.8
202	HFR	HFR	45	45	100%	9%	16%	16%	16%	0.0	16%	0.0
203	HFR	HFR	3	3	100%	23%	30%	30%	15%	0.4	15%	0.4
204	HFR	HFR	32	32	100%	29%	36%	36%	27%	2.9	27%	2.9
205	HFR	HFR	7	7	100%	26%	33%	33%	24%	0.6	24%	0.6
206	HFR	HFR	242	242	100%	25%	32%	32%	25%	16.9	25%	16.9
208	HFR	HFR	22	22	100%	13%	20%	20%	20%	0.0	20%	0.0
209	HFR		40	40	100%	14%	21%	14%	18%	1.2	14%	0.0
210	HFR	HFR	48	48	100%	29%	36%	36%	27%	4.3	27%	4.3
213	HFR	HFR	15	15	100%	13%	20%	20%	20%	0.0	20%	0.0
214	HFR	HFR	10	10	100%	29%	36%	36%	25%	1.1	25%	1.1
215	HFR		26	26	100%	15%	22%	15%	18%	1.0	15%	0.0
216	HFR		14	14	100%	17%	24%	17%	17%	1.0	17%	0.0

EA Unit/Stand Number	Proposed Activity HFR = Final Removal Cut		Treated Acres	Unit Acres	Percent Treated	Existing Detrimental Soil Conditions (%)	Estimated Detrimental Soil Conditions After Treatment (%)		Estimated Detrimental Soil Conditions After Restoration (%/Acres)			
	Alt 2	Alt 3					Alt 2	Alt 3	Alt 2		Alt 3	
217	HFR	HFR	48	48	100%	30%	37%	37%	28%	4.4	28%	4.4
218	HFR	HFR	51	51	100%	29%	36%	36%	27%	4.6	27%	4.6
219	HFR		19	19	100%	22%	29%	22%	20%	1.7	22%	0.0
220	HFR		38	38	100%	15%	22%	15%	18%	1.6	15%	0.0
221	HFR	HFR	32	32	100%	14%	21%	21%	18%	0.9	18%	0.9
222	HFR		24	24	100%	15%	22%	15%	20%	0.5	15%	0.0
223	HFR		38	38	100%	14%	21%	14%	18%	1.2	14%	0.0
225	HFR	HFR	12	12	100%	13%	20%	20%	20%	0.0	20%	0.0
226	HFR		39	39	100%	15%	22%	15%	18%	1.6	15%	0.0
227	HFR	HFR	15	15	100%	29%	36%	36%	27%	1.4	27%	1.4
228	HFR	HFR	13	13	100%	17%	24%	24%	17%	0.9	17%	0.9
229	HFR	HFR	19	19	100%	15%	22%	22%	15%	1.3	15%	1.3
230	HFR	HFR	24	24	100%	29%	36%	36%	27%	2.1	27%	2.1
231	HFR	HFR	45	45	100%	13%	20%	20%	20%	0.0	20%	0.0
232	HFR	HFR	40	40	100%	30%	37%	37%	28%	3.6	28%	3.6
234	HFR	HFR	10	10	100%	19%	26%	26%	19%	0.7	19%	0.7
237		HFR	119	119	100%	23%	23%	30%	23%	0.0	23%	8.3
238	HFR		10	10	100%	9%	16%	9%	16%	0.0	9%	0.0
239	HFR		14	14	100%	10%	17%	10%	17%	0.0	10%	0.0
240	HFR	HFR	28	34	82%	9%	16%	16%	16%	0.0	16%	0.0
241	HFR	HFR	21	21	100%	8%	15%	15%	15%	0.0	15%	0.0
242	HFR	HFR	41	41	100%	29%	36%	36%	28%	3.3	28%	3.3
243	HFR	HFR	28	28	100%	29%	36%	36%	27%	2.5	27%	2.5
245	HFR	HFR	39	39	100%	33%	40%	40%	31%	3.5	31%	3.5
247	HFR	HFR	28	28	100%	14%	21%	21%	18%	0.9	18%	0.9
248	HFR	HFR	25	25	100%	29%	36%	36%	27%	2.2	27%	2.2
249	HFR	HFR	44	44	100%	17%	24%	24%	19%	2.2	19%	2.2
250	HFR	HFR	8	27	30%	17%	19%	19%	19%	0.0	19%	0.0
254	HFR	HFR	44	44	100%	14%	21%	21%	17%	1.7	17%	1.7
255	HFR	HFR	6	9	67%	29%	34%	34%	25%	0.8	25%	0.8
256	HFR	HFR	6	6	100%	29%	36%	36%	25%	0.7	25%	0.7
257		HFR	56	56	100%	23%	23%	30%	23%	0.0	23%	3.9
258		HFR	127	127	100%	29%	29%	36%	29%	0.0	29%	8.9
259	HFR	HFR	34	34	100%	25%	32%	32%	23%	3.1	23%	3.1
260		HFR	93	93	100%	23%	23%	30%	23%	0.0	23%	6.5
261	HFR	HFR	11	11	100%	9%	16%	16%	16%	0.0	16%	0.0
262	HFR	HFR	10	10	100%	15%	22%	22%	15%	0.7	15%	0.7
264	HFR	HFR	64	64	100%	14%	21%	21%	17%	2.5	17%	2.5
265	HFR	HFR	86	86	100%	14%	21%	21%	20%	0.9	20%	0.9
266	HFR	HFR	14	14	100%	24%	31%	31%	22%	1.2	22%	1.2
267	HFR	HFR	8	21	38%	8%	11%	11%	11%	0.0	11%	0.0
270		HFR	35	35	100%	29%	29%	36%	29%	0.0	29%	2.4
271	HFR	HFR	22	22	100%	9%	16%	16%	16%	0.0	16%	0.0
274		HFR	15	15	100%	29%	29%	36%	29%	0.0	26%	1.5
275	HFR		6	6	100%	19%	26%	19%	19%	0.5	19%	0.0

EA Unit/Stand Number	Proposed Activity HFR = Final Removal Cut		Treated Acres	Unit Acres	Percent Treated	Existing Detrimental Soil Conditions (%)	Estimated Detrimental Soil Conditions After Treatment (%)		Estimated Detrimental Soil Conditions After Restoration (%/Acres)			
	Alt 2	Alt 3					Alt 2	Alt 3	Alt 2		Alt 3	
276	HFR	HFR	28	28	100%	16%	23%	23%	19%	1.1	19%	1.1
277	HFR		24	24	100%	23%	30%	23%	21%	2.2	23%	0.0
278		HFR	16	16	100%	29%	29%	36%	29%	0.0	27%	1.5
279		HFR	10	10	100%	23%	23%	30%	23%	0.0	20%	1.0
280	HFR		5	5	100%	19%	26%	19%	19%	0.3	19%	0.0
282	HFR	HFR	32	32	100%	10%	17%	17%	17%	0.0	17%	0.0
283	HFR	HFR	39	39	100%	31%	38%	38%	30%	3.1	30%	3.1
284		HFR	9	9	100%	17%	17%	24%	17%	0.0	17%	0.7
285	HFR	HFR	3	3	100%	13%	20%	20%	20%	0.0	20%	0.0
286	HFR	HFR	74	74	100%	26%	33%	33%	26%	3.0	26%	3.0
288	HFR	HFR	15	15	100%	29%	36%	36%	25%	1.6	25%	1.6
290	HFR	HFR	30	30	100%	13%	20%	20%	20%	0.0	20%	0.0
291	HFR	HFR	14	14	100%	13%	20%	20%	20%	0.0	20%	0.0
292	HFR	HFR	29	29	100%	13%	20%	20%	20%	0.0	20%	0.0
293	HFR	HFR	27	27	100%	13%	20%	20%	20%	0.0	20%	0.0
294	HFR	HFR	24	24	100%	14%	21%	21%	18%	0.7	18%	0.7
295	HFR		108	108	100%	8%	15%	8%	15%	0.0	8%	0.0
296	HFR		71	71	100%	30%	37%	30%	30%	5.0	30%	0.0
298	HFR	HFR	9	9	100%	26%	33%	33%	23%	0.9	23%	0.9

Appendix 3 – Current and Foreseeable Projects

The effects of the following projects were considered in the analysis of cumulative effects.

Miscellaneous Post-Sale Project. Hand- felling of small diameter trees. Uses ground based equipment to accomplish vegetation management objectives.

Ponderosa pine release Project.

Rim Personal Use Woodcutting Area. In the northeastern portion of the project area.

Road Closures. Approximately 45.3 miles of road closures associated with Decisions supported by the following Environmental Assessments: Topso (1991), Woof (1994), Emerald (1996), Prairie Dog (1996), and Central (1999).

Edge Timber Sale. No overlap with Long Prairie units. NEPA analysis documented in the Central EA. Old "Troll Firewood Units." Treatment consists of removing dead/down trees.

Gem Timber Sale. No overlap with Long Prairie units. NEPA analysis documented in the Emerald EA. Treatment consists of removing overstory trees.

Howlet Fuels CE for Natural Fuels Treatment. No overlap with Long Prairie units. NEPA analysis ongoing. Proposed treatments include underburning, mowing of shrubs, and potentially some removal of lodgepole pine.