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Environmental Assessment

Crescent Lake Wildland-Urban Interface Fuels Reduction Project

Crescent Ranger District, Deschutes National Forest
Klamath County, Oregon

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Purpose and Need for Project

Introduction

The Crescent Lake Wildland-Urban Interface Fuels Reduction Project Area is located on the Crescent Ranger District of the Deschutes National Forest, Klamath County, Oregon (Figure 1). The legal description of the project area is as follows:

T 23 S, R 6 E, Sections 24, 25, 26, 35
T 23 S, R 7 E, Sections 31
T 24 S, R 6 E, Sections 1, 2, 11, 12, 13, 24, 25, 26, 27, 34, 35, 36
T 24 S, R 7 E, Sections 5, 6, 7, 8, 17, 18, 19, 20, 21, 29, 30, 31

This environmental analysis will describe and analyze the environmental effects of the proposed action and alternatives.

The project is located near the community of Crescent Lake and includes the forested land around this and other areas of development such as the Crescent Lake Townsite, Camp Makualla (the Boy Scout Camp), the Crescent Lake and Junction Snoparks, Odell and Crescent Lake Resorts, Crescent Pines, Cres-Del Acres, and Diamond View Estates. The Union Pacific Railway, State Highway 58, and utility corridors all traverse the project area as well. The project area includes approximately 12,600 acres; 2,560 of these are in private ownership.

Based on the terms used in the document, *A Report to the Council of Western States foresters – Fire in the West – The Wildland Urban Interface Fire Problem*, dated September 18, 2000, the project area fits the definition of an Urban Wildland Interface Community. Under this definition, "the urban wildland interface community exists where humans and their development meet or intermix with wildland fuel." This project is intended to protect and sustain natural resources, particularly vegetation, wildlife habitat, and watershed integrity, and increase the safety of wildland firefighters and people living in the wildland-urban interface areas. Crescent Lake, Oregon is identified as one of many "Communities in the Vicinity of Federal Lands at Risk from Wildfire," published in the Federal Register, Volume 66, No. 160, August 17, 2001.

Purpose and Need

The purpose of the proposed activities is to accomplish the following:

1. Reduce the amount of surface and ladder fuels.
2. Lower fire hazard around the community of Crescent Lake and other developments in the area, including group camps, resorts, and subdivisions.
3. Lower fire hazard throughout the project area to reduce the risk of high severity fires that could spread quickly and be difficult to control.
4. Improve growth and vigor of trees by thinning in managed plantations.
5. Enhance the growth and vigor of overstory trees and reduce competition and stress to remaining trees by thinning outside of managed plantations.
6. Remove unhealthy lodgepole in the overstory and promote growth of other species where possible.
7. Provide administrative access for vegetation management and fuels reduction treatments.
8. Provide sufficient access for firefighters and adequate escape routes from private property.
9. Improve the condition of riparian meadows where lodgepole encroachment has occurred.

The need for the proposed activities is demonstrated by the following conditions and trends:

Currently, fire hazard and fuel levels in the Crescent Lake Wildland Urban Interface (WUI) planning area are at moderate to high levels. Aggressive fire suppression has resulted in changed vegetative conditions and has increased the potential for higher severity fires. Fire historically has played an important role as a disturbance regime in the development of stand and landscape structure through time. Since European settlement, fire suppression has reduced the natural role of fire on the landscape. As a result, stand structures and densities have been altered, leaving the planning area with higher stocked stands. The amount of area that is currently susceptible to higher severity fire has increased as a result of changes in the abundance and continuity of fuels within the planning area.

The Odell Watershed Analysis (USFS 1999) and the Big Marsh Watershed Analysis (USFS 1997) discuss the trend of increased susceptibility for high severity fires due to fuels buildup. Much of the project area is dominated by lodgepole pine with dense understories. Stand densities in the project area provide a high probability of sustained crown fire under typical summer weather conditions. Many decadent lodgepole pine stands extend to the banks of Crescent Creek and its tributaries, placing the riparian areas at risk of severe fire.

The current condition of fire hazard is the result of well-intentioned fire suppression policies for most of the twentieth century that initiated trends of heavier ground fuel accumulations and changes in stand structures. These conditions could result in greater instances of stand replacement fires than occurred historically. The project area has an increased fire risk because of the various human uses, including seasonal and full-time residents, businesses, designated campgrounds, and resorts. Fire occurrence is considered high along the Union Pacific Railway and State Highway 58, which bisect the project area.

Reducing fuels within the wildland urban interface can help reduce the rate of spread and increase the ability to control low to moderate intensity wildfire within the project area. There are many other forest values in the project area outside the immediate vicinity of homes. These values can be protected through fuels reduction and improved forest conditions.

The Davis Late Successional Reserve Assessment (USFS 1995, Amended 2002) identifies desired conditions and management strategies for reaching them. The portion of the project area that lies within the Davis Late Successional Reserve (LSR) is the main area of frequent human use in the LSR. As such, management objectives include the need to maintain the area as a low fire hazard buffer between the urban interface and the adjacent, more sensitive area to the east.

Some of the units that require fuels reduction treatments are currently inaccessible by road. Forest Road 6020100 is in a condition that makes it difficult or impossible to travel on throughout much of the year. This causes degradation of riparian resources in the area and also makes it inaccessible for fire suppression or fuels reduction.

Proposed Action

The Forest Service proposes to address the purpose and need by treating approximately 3,900 acres to achieve sustainable vegetative conditions and lower the risk of stand replacement wildfire. Table 1 displays the treatments considered in the proposed action.

Table 1. Proposed Action Summary

Action	Acres*
Small tree thinning (trees < 8" dbh)	3,600
Thinning (trees >= 8" dbh)	1,525
Hand Pile and Burn or Utilize Piles	3,250
Machine Pile and Burn or Utilize Piles	3,220
Mechanical Brush Treatment	165
Pruning of Limbs	195
Prescribed Underburning	170
Meadow Edge Treatments – small tree thinning, hand piling, and burning	210
Road Relocation	2 miles
Road Decommissioning	2 miles
Road Re-Opening	1 mile

* All measures are approximate. More than one activity may occur on a unit. Actual acres treated would be reduced by such things as 15% retention areas and avoidance of sensitive areas. Thinning includes opportunities for firewood and posts and poles.

Scoping

The initial scoping period began with appearance of the proposed project in the spring 2002 issue of the *Schedule of Projects for the Deschutes and Ochoco National Forests.* On June 26, 2002, a letter describing the project in general terms was mailed to 525 interested parties, agencies, and residents and property owners within the project area. Later, in November 2002, another letter was sent that included a more detailed description of the proposed activities and treatment unit locations. Responses to the scoping are discussed under Public Involvement on Page 58.

Planning Issues

Key Issues

Key issues are those that represent a point of debate or concern that cannot be resolved without consideration of the trade-offs involved. These issues spur the design of alternatives to the proposed action that provide a different path to achieve project objectives. Trade-offs can be more clearly understood by developing alternatives and displaying the relative impacts of these alternatives weighed against the proposed action.

Fire Hazard and Silvicultural Condition

The purpose of the proposed action is to reduce the amount of fuels that have accumulated, reduce high stocking levels, and lower the project area's susceptibility to higher severity fires. The effectiveness of the fuels treatments may vary between alternatives that are developed to address other issues, such as wildlife habitat. Attributes used for displaying effects and comparing alternatives include:

- Expected fire behavior
- Crown fire potential
- Probability of mortality
- Amount of project area on which the fire hazard is effectively lowered
- Degree that total fuel loadings are reduced on treated acres.

The goal of the treatments is to reduce the level of fuels and create stand conditions after treatment that reduce the chances of a wildfire spreading from federal lands to private and vice-versa. These desired stand conditions are more sustainable over time and less susceptible to loss from wildfire, insects, and disease. By analyzing this issue, we intend to answer the following question for this project area: will further reduction in basal area (removing more trees) over the proposed action make a substantial difference in expected fire behavior and will it create stand conditions that are less susceptible to wildfire for a longer period of time? This objective will be measured by:

- The percentage of high-risk stands in the project area
- Resulting high-risk stands after treatment.

Spotted Owl Habitat

Within the boundaries of the Crescent Lake WUI project are forested stands that provide suitable nesting, roosting, and foraging (NRF) habitat, and younger-aged stands that are suitable for dispersing northern spotted owls. Proposed vegetative treatments associated with this project may result in the short-term and/or long-term conversion of NRF habitat into stands less suitable for occupancy by northern spotted owls. Attributes and evaluation criteria used in comparing the effects of the alternatives are:

- NRF degradation and loss of structure, measured by acres of NRF treated and percentage of the total NRF remaining after silviculture and fire treatments completed and by acres of NRF treatment within the Davis LSR.
- Dispersal capability, particularly the cumulative effects resulting from the proposed action and the other ongoing silviculture projects in the area.

Analysis Issues

In addition to the key issues, other environmental components will be considered in the Effects section in Chapter 3 as a way to compare the alternatives, though they did not result in differing design elements between alternatives. These issues are important for providing the Responsible Official with complete information about the effects of the project.

Wildlife

- Big Game Hiding Cover
- Management Indicator Species Habitat
- Resident and Migratory Landbirds
- Key Elk Management Areas
- Proposed, Endangered, Threatened, and Sensitive Species

Riparian and Aquatic Components

- Water Quality
- Aquatic Species and Fish Habitat
- Riparian Reserves and Aquatic Conservation Strategy
- Wild and Scenic River Corridors

Other

- Air Quality
- Proposed, Endangered, Threatened, and Sensitive Plant Species
- Survey & Manage Plant and Animal Species
- Soil Quality
- Noxious Weeds
- Financial Efficiency
- Matsutake Mushroom Harvest

Management Direction

Deschutes National Forest Land and Resource Management Plan

The 1990 Deschutes National Forest Land and Resource Management Plan (Forest Plan), as amended, guides all natural resource management activities and provides standards and guidelines for the Deschutes National Forest. The standards and guidelines apply where the amendment (Northwest Forest Plan) provides no particular guidance or where the Forest Plan provides more restrictive direction than that found in the amendment.

The following Forest Plan management areas (MA) are found in the project area:

Intensive Recreation (2,283 acres) – This management area provides a wide variety of quality outdoor recreation opportunities within a Forest environment where the localized settings may be modified to accommodate large numbers of visitors. Odell and Crescent Lakes are the primary Intensive Recreation areas in the project.

Old Growth (291 acres)– The goal of this MA is to provide naturally evolved old growth forest ecosystems for the following purposes: habitat for plant and animal species associated with old growth forest ecosystems; representations of landscape ecology; public enjoyment of large, old-tree environments; and the needs of the public from an aesthetic spiritual sense.

General Forest (4,158 acres)– This MA emphasizes timber production while providing forage production, visual quality, wildlife habitat, and recreational opportunities for public use and enjoyment.

Scenic Views (959 acres)– The goal of Scenic Views management areas is to provide high quality scenery that represents the natural character of Central Oregon. Landscapes seen from selected travel routes and use areas will be managed to maintain or enhance their appearance. To the casual observer, results of activities either will not be evident, or will be visually subordinate to the natural landscape.

Wild and Scenic Rivers (1,506 acres) – The primary objectives for managing waterways that are components of the National Wild and Scenic Rivers System will be to protect the outstandingly remarkable values identified for each and for maintaining the free-flowing nature of the river. Within the project area, Crescent and Big Marsh Creeks are designated as wild and scenic based on outstandingly remarkable values identified for each stream.

Bald Eagle Management Area (836 acres) – Nesting and foraging habitat in this area will be managed to protect and enhance the carrying capacity of bald eagles. Suitable nesting sites will be provided on a continuing basis. Old growth stands with large trees will be emphasized, and human disturbance will be minimal during the nesting season.

Oregon Cascades Recreation Area (21 acres)- The goal of OCRA is to conserve, protect, and manage in a substantially undeveloped condition the unique values associated with the area. Dispersed recreation opportunities and wildlife, fish, and scenic resources are featured.

Key Elk Area – Elk are found in certain key habitat areas, within which management will provide conditions needed to support certain numbers of summering and wintering elk. The Maklaks Key Elk Area overlaps a portion of the project boundary near Highway 58. Standards and Guidelines address recreation, road, and vegetation management.

Management Indicator Species - During the preparation of the Deschutes National Forest Land and Resource Management Plan (USDA 1990), a group of wildlife species were identified as management indicator species (MIS). These species were selected because their welfare could be used as an indicator of other species dependent upon similar habitat conditions. Indicator species can be used to assess the impacts of management actions on a wide range of other wildlife with similar habitat requirements. The species selected for the Deschutes National Forest include the redtail hawk, golden eagle, osprey, peregrine falcon, northern bald eagle, northern spotted owl, northern goshawk, coopers hawk, sharp-shinned hawk, three-toed woodpecker, American marten, osprey, woodpeckers, great gray owl, great blue heron, waterfowl, wolverine, elk, mule deer, pine martin, western big-eared bat, species associated with logs and down woody debris, and species associated with various plant communities and successional stages.

Roadless – The project area does not contain any Inventoried Roadless Areas.

Northwest Forest Plan

Late Successional Reserve (700 acres) – The Davis Late Successional Reserve (LSR) covers nearly 50,000 acres. As discussed in the Northwest Forest Plan's Record of Decision for the Northwest Forest Plan, silviculture aimed at reducing the risk of stand-replacing fires may be appropriate, including thinning and underburning. "Managers need to seek a balanced approach that reduces risk of fire while protecting large areas of fire-prone late-successional forest." (ROD B-8). Approximately 700 acres of the project area lie within the Davis LSR; 244 acres are included in the proposed action.

Administratively Withdrawn (1,876 acres)– These areas are identified in the Deschutes LRMP and occur in the project area as Intensive Recreation and Old Growth MAs.

Matrix (6,048 acres)– Silvicultural systems within the matrix contribute to management of the Late-Successional Reserves. Fire and fuels management in the matrix can reduce the risk of fire and other large-scale disturbances that would jeopardize the reserves (ROD B-8).

Congressionally Reserved (1,409 acres)– These areas maintain management direction of the Deschutes Forest Plan. They include lands with congressional designations that normally preclude scheduled timber harvest. In the project area, Congressionally Reserved corresponds to Wild and Scenic River Corridors and Oregon Cascades Recreation Area.

Riparian Reserve (4,220 acres)– As part of the Northwest Forest Plan's Aquatic Conservation Strategy, Riparian Reserves are lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use. The objective is to restore and maintain the health of watersheds and the aquatic ecosystems they contain. Riparian Reserves overlap the Management Allocations listed above.

Key Watershed – Odell Creek is a Tier 1 Key Watershed. Part of a network of 143 Tier 1 key watersheds that are designated to ensure that refugia are widely distributed across the landscape, this watershed contributes directly to the conservation of the threatened bull trout and resident fish populations.

Area Assessments

Watershed Analyses

The project area is located within two 5th field watersheds: Upper Deschutes (1707030101) and Crescent (1707030205). Watershed analyses have been completed for both of these watersheds (USFS 1997, USFS 1999). Key trends were identified within these watersheds and the purpose for initiating this project is rooted in some of these trends.

Late Successional Reserve Assessment

The Davis Late Successional Reserve Assessment (LSRA) was prepared in 1995 and amended in 2002. The LSRA was prepared to answer two key questions: How does the Davis LSR serve as habitat for late-successional and old-growth related species including the northern spotted owl, and where and when are forest management activities needed to protect and enhance the existing and potential habitat for late-successional and old-growth related species within the LSR? Proposed units overlap Management Strategy Areas Z which has an objective to provide a low fuels buffer between the urban interface and Management Strategy Area Y (see Figure 7).

BEMA and Nest Site Plans

These documents were developed to meet the Deschutes National Forest Land and Resource Management Plan goal of providing a long-range management plan that addresses recommendations for vegetation, fuels, recreation, and transportation in BEMAs and eagle nest sites (see Figure 3). The Crescent and Odell Lakes BEMA and Nest Sites Plan includes a compilation of recommendations and direction from other planning efforts as well as recommendations for management strategies specific to the Crescent and Odell Lake BEMAs and nest sites (USFS 1998).

National Fire Plan

Following the extreme fire season of 2000, Congress directed Federal land management agencies to work with State governments to develop a national strategy for the restoration of fire-adapted ecosystems. The Plan was intended to respond to severe wildland fires, reduce impacts on rural communities, and ensure effective firefighting capacity. The goals of the resulting 10-year Comprehensive Strategy are to improve prevention and suppression, to reduce hazardous fuels, to restore fire-adapted ecosystems, and to promote community assistance. Specific actions designed to reach those goals include prioritizing management activities so that communities that are most at risk in the wildland-urban interface receive priority for hazardous fuels treatments, develop strategies to address fire-prone ecosystem problems that augment fire risk or threaten sustainability, and promote knowledge of wildland fire and its role in natural ecosystem processes.

The National Fire Plan also addresses local employment opportunities in rural communities. The Crescent Lake WUI project has opportunities for stewardship contracting. Stewardship contracting is authorized under the 2003 Appropriations Act (Public Law 108-7). As another tool to complete the work, stewardship contracting allows goods for services, while emphasizing on-the-ground results.

Roads Analysis Report

According to the Forest Service Road Management Policy published January 12, 2001, all NEPA decisions signed after January 12, 2002, that involve certain changes in the transportation system must be informed by a Roads Analysis. A project-level Roads Analysis was completed for the Crescent Lake WUI Project area. The Roads Analysis was an interdisciplinary process that provides the decision maker information on the needs, opportunities, and priorities for the road system. Priorities identified in the project area Roads Analysis are: provide access for administrative use and fire suppression; provide access to inholdings, easements, rights of ways, and special use permits; reduce the road system's ability to introduce and spread noxious weeds; reduce impacts to the aquatic system; and address concerns about Forest roads crossing private property.

Water Quality Restoration Plan

Completed by the Crescent Ranger District in May 2002, and reviewed by the Oregon Department of Environmental Quality (ODEQ), the Crescent Creek Water Quality Restoration Plan is a watershed enhancement plan to reduce summer stream temperatures and achieve compliance with water quality standards. The plan concludes that Crescent Creek is exceeding water quality standards for temperature primarily because of the release of water from Crescent Lake reservoir. One of the objectives for helping to attain ODEQ water quality standards that is within the scope of the current fuels reduction project is improving growth rates of upland vegetation to attain the site potential growth heights of trees along the streams to maintain shade.

Decision to be Made

The deciding officer is the District Ranger of the Crescent Ranger District, Deschutes National Forest. The decision maker will determine which alternative with mitigation measures best meets the purpose, need, and scope of this project, and best addresses the issues and public concerns. Specific decision criteria include: How much fuels and/or vegetation treatment will occur at this time and at what intensity level? How will access within the project area be managed?

Figure 1. Project Location

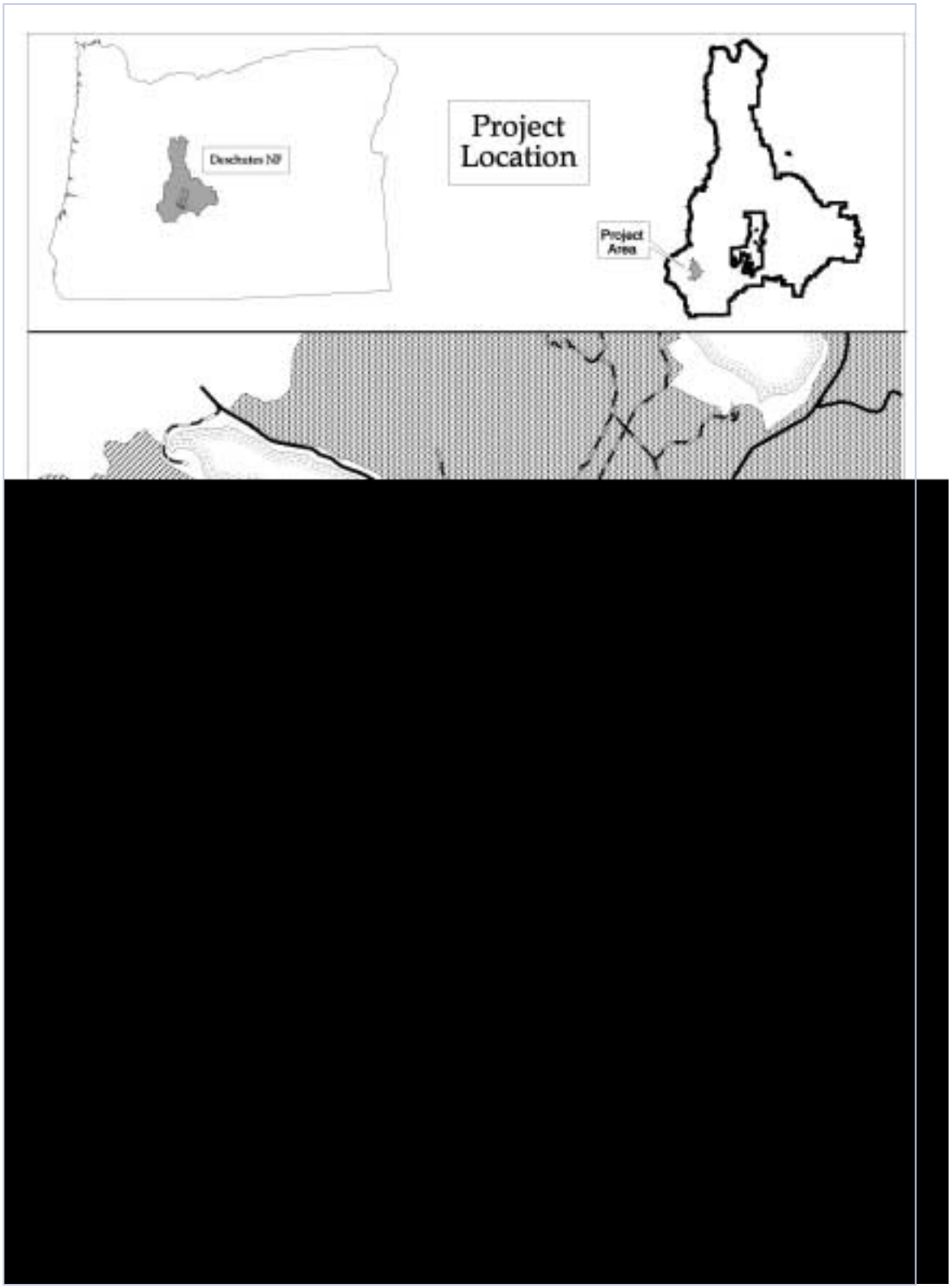


Figure 2. Northwest Forest Plan Management Allocations

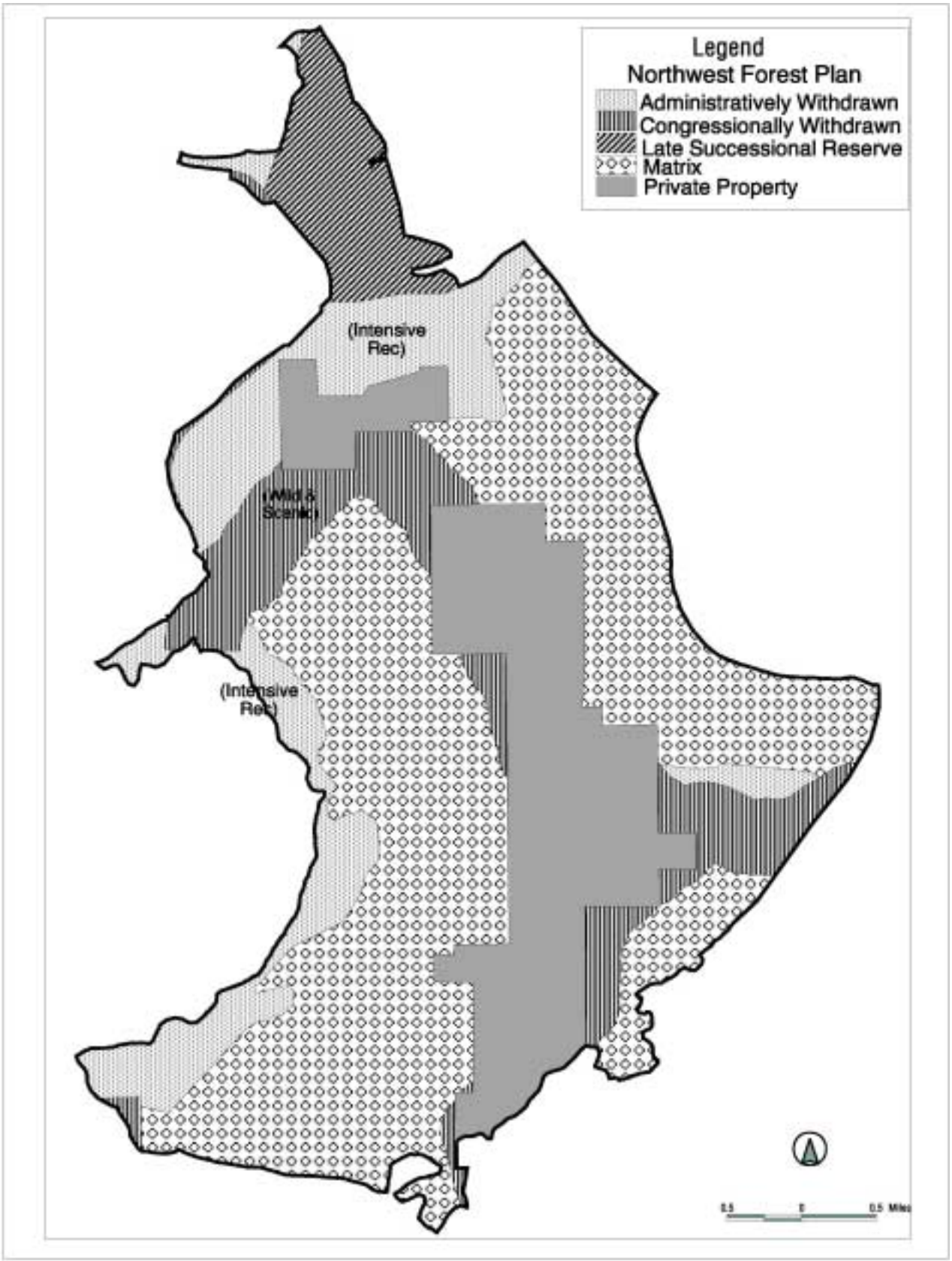
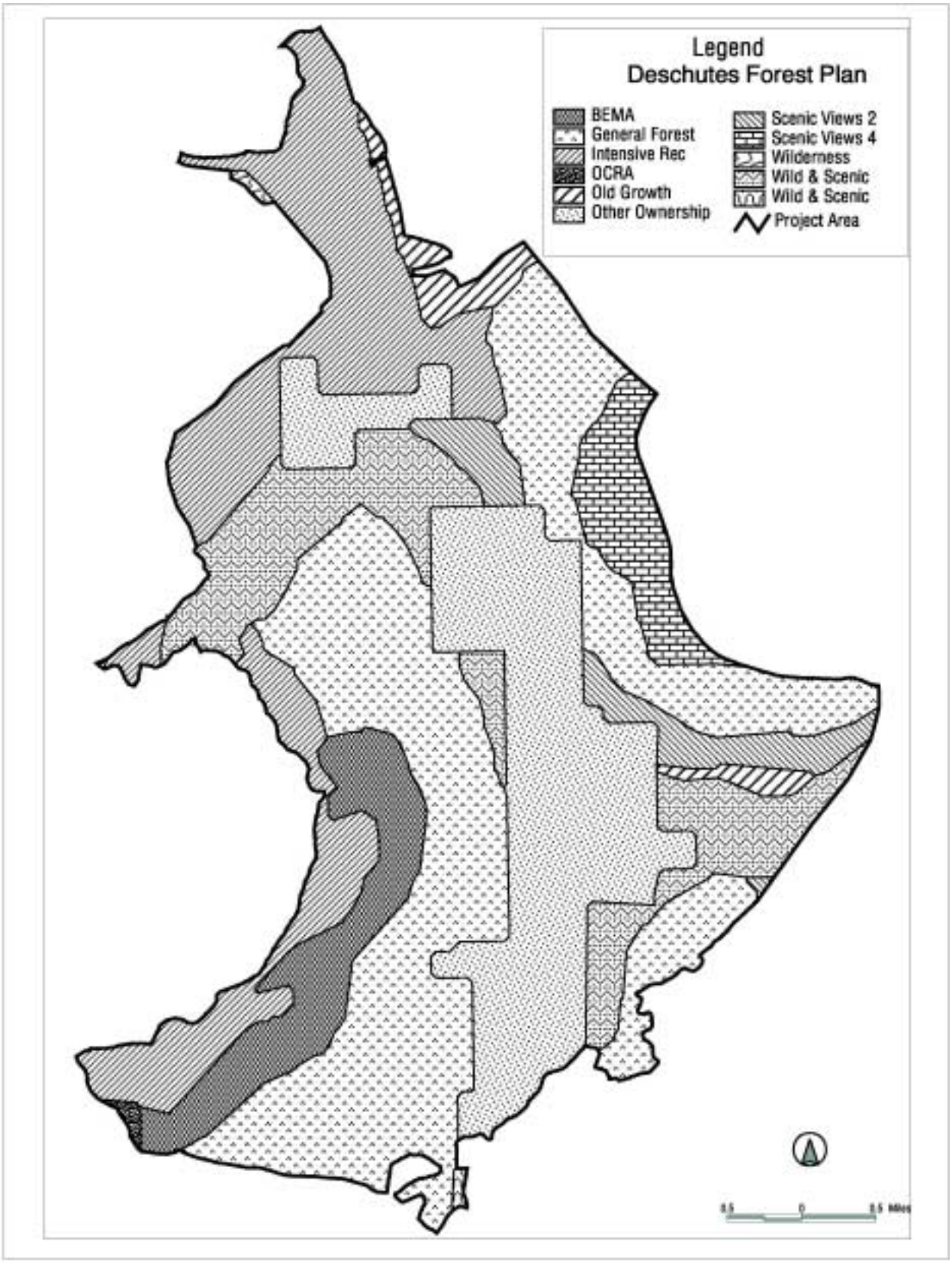


Figure 3. Deschutes National Forest Plan Management Areas



Alternatives

Alternative Development

Proposed Action

The objective of the proposed action is to reduce the risk of catastrophic fire by reducing surface and ladder fuels. As shown in Table 1, approximately 3,900 acres of the project area would be treated by the proposed action, mostly through small tree thinning, thinning, and piling and burning of fuels. The proposed action also includes construction of about two miles of new system road to provide access to the units east of the railroad tracks and decommissioning an existing two miles of road.

Based on issues that arose during scoping, the interdisciplinary team developed alternatives to the proposed action. All alternatives are designed to meet the purpose and need and to be consistent with applicable laws. Four alternatives will be analyzed in detail.

Alternatives Not Considered in Detail

An alternative was briefly addressed by the interdisciplinary team that would simply treat, in an aggressive way, the fuels within a prescribed distance from the private property boundaries, such as creating a 200-foot fuel break free of any vegetation. This alternative would not meet some of the objectives that address the health of forest stands throughout the project area, and would leave much of it at a high risk to wildfire, insects, and disease. Reducing fuels within the wildland-urban interface can help reduce the rate of spread and increase the ability to control low to moderate intensity wildfire within these areas. Reducing fuels throughout the analysis area minimizes the risk of high intensity crown or spotting fires moving through or over wildland urban interface fuel reduction areas. Also, there are many important forest values (i.e. late-successional habitat, water quality, soil productivity, and scenic quality) that need protection. The ID Team did not feel that simply treating within a certain distance of private property would adequately address forest health concerns, or the high risk of fire to local residents and visitors.

The team did, however, consider the utility of varying treatment prescriptions within certain distances of either roads, power lines, or private property, particularly in areas where there is a need to treat fuels in stands adjacent to private property, but wildlife habitat is a primary concern. For example, in Unit 32, precommercial thinning prescriptions would have a wider spacing adjacent to the private property, with the spacing becoming narrower further away from the private property.

The component of the proposed action involving construction of 2 miles of new system road was not analyzed in detail. The Roads Analysis process provided recommendations for the transportation system, including the recommendation to reconstruct and improve Forest Road 6020100. Construction of a new road paralleling the 6020100 would not meet Riparian Reserve standards and guidelines from the Northwest Forest Plan and therefore will not be considered further.

Alternatives

Alternative 1 (No Action)

Under the No Action alternative existing processes and habitat cycles in the project area would continue largely without intervention. Current management of recreation use and services, fire suppression, hazard trees, and standard road maintenance would continue. However, no actions would be taken to reduce the amount of fuels in the project area. No road improvement on 6020100 would take place. This alternative will be evaluated as the baseline condition.

Alternative 2

Alternative 2 remains closest to the original Proposed Action. The modifications include the following: Alterations to unit 80 and deletion of unit 78 because of wildlife nest locations. Some spotted owl nesting, roosting, and foraging habitat has been dropped. Retention areas are increased to 20 percent on four units totaling 523 acres, to maintain big game hiding cover habitat. Some plantations that were proposed for precommercial thinning were analyzed in other recent decision documents and therefore dropped from this project. Fuels reduction within riparian reserves has been specified for each unit, with some areas adjacent to streams deferred from any treatment and some areas designated for thinning trees under 4" followed by hand piling outside a distance from the stream channel (See Mitigation and Design Elements, Page 20).

Approximately **3,450** acres are proposed for treatments, primarily through reduction of ladder fuels by small tree thinning. Machine and/or hand piling to reduce slash will follow all thinning treatments. Ten units have been identified as commercial or personal firewood opportunity and eight units appear to be good candidates for posts and poles, although there may be more of these opportunities available.

Units located within the Davis Late Successional Reserve are situated linearly along State Highway 58 and the power line that parallels it to the east as well as around the recreation sites at Odell Lake Lodge and Odell Creek Campground. This distribution of treatment is expected to effectively provide a buffer of low fire hazard between the areas of high human use and the adjacent Management Strategy Area.

Two units (80 and 88) are designated as Meadow Treatments where precommercial thinning will take place around the periphery of the meadow to reduce fuels and encroachment; slash will then be piled upon decadent willows in the meadow for burning.

Alternatives are displayed in Figures 4, 5 and 6.

Alternative 3

The intent of this alternative is to demonstrate a higher level of treatment within stands, reducing stand density by removing more trees over 8" dbh. The resulting silvicultural condition will be compared to the other alternatives by looking at the resulting amount of high-risk stands and difference in silvicultural condition. The alternatives may differ in the length of time treatments are effective and the additional improvement in stand health and resilience to insect and diseases more than in the changes to expected fire behavior. A total of 3,450 acres would be treated with this alternative. The other components described above (retention areas, meadow treatments) are the same. Slightly more temporary road construction is required with this alternative because of the high amount of commercial thinning.

Alternative 4

A key issue, primarily because of other past and on-going projects in the area, is the expected impacts to northern spotted owl habitat. This alternative responds to the spotted owl issue by eliminating treatment on 90 acres of spotted owl nesting, roosting, and foraging habitat (compared to the proposed action), and reducing treatment on some 110 acres to only thinning trees less than 8" dbh.

Table 2. Summary of Alternatives

Treatment		Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
Small tree thinning (trees < 8" diameter)	Mature Stands	0	2,630	2,710	2,520
	Managed Plantations	0	611	611	611
Thinning (trees >= 8" diameter)		0	1,175	1,980	955
Thinning & Salvage of down/dead		0	480	480	55
Hand and/or Machine Pile & Burn Piles		0	3,450	3,450	3,340
Mechanical Brush Treatment (Mowing) and/or Pruning		0	210	210	210
Underburning		0	100	100	0
Meadow Treatments		0	170	170	170
Temporary Road Development		0	5.80	7.73	5.31
Road Reconstruction		0	2	2	2

Acres are approximate and are rounded to the nearest 5. More than one activity may occur on a single unit. Actual acres treated would be reduced by such things as 15% retention areas and avoidance of sensitive areas, such as areas of continuously wet soils.

Figure 4. Alternative 2

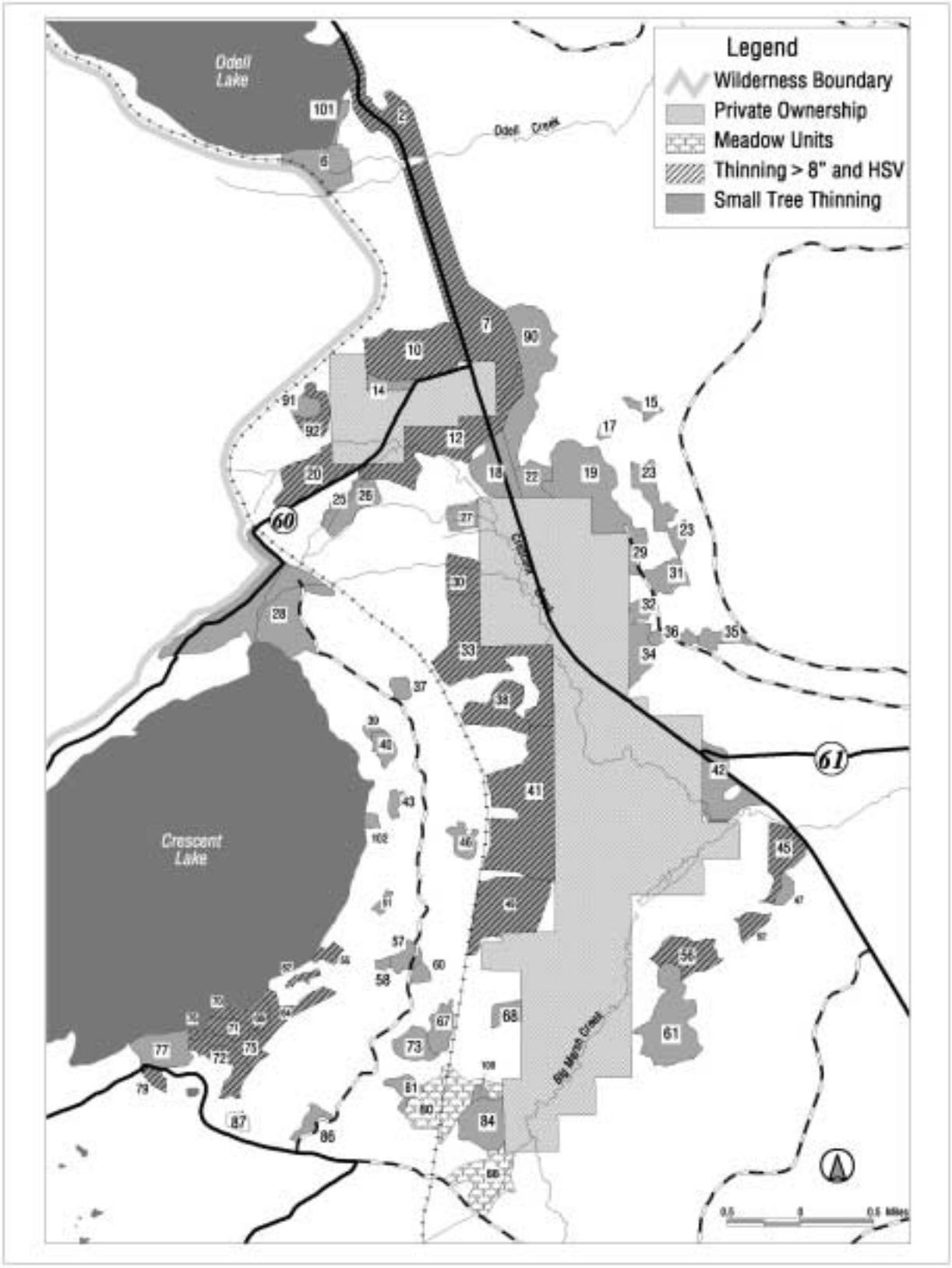


Figure 5. Alternative 3

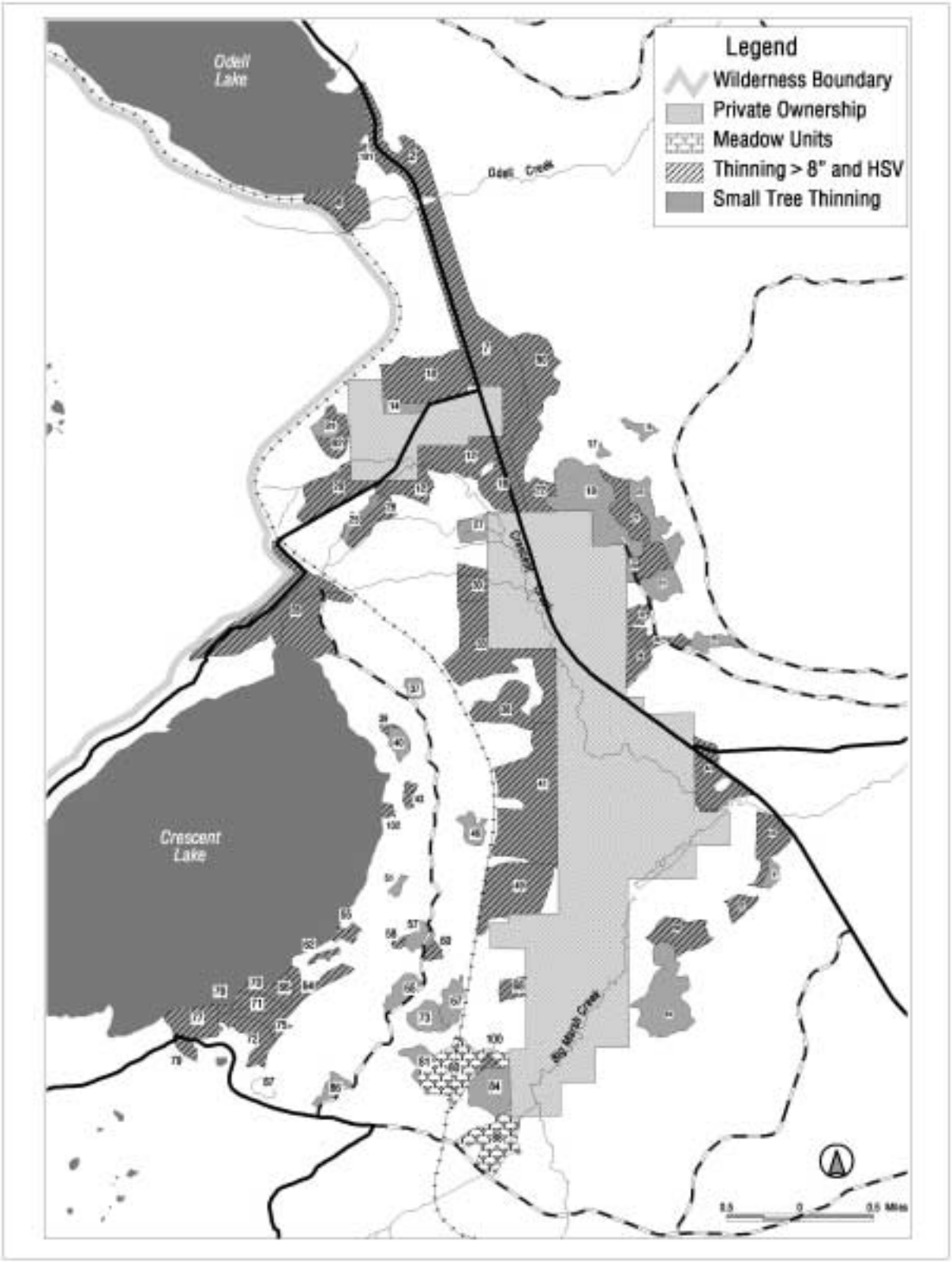
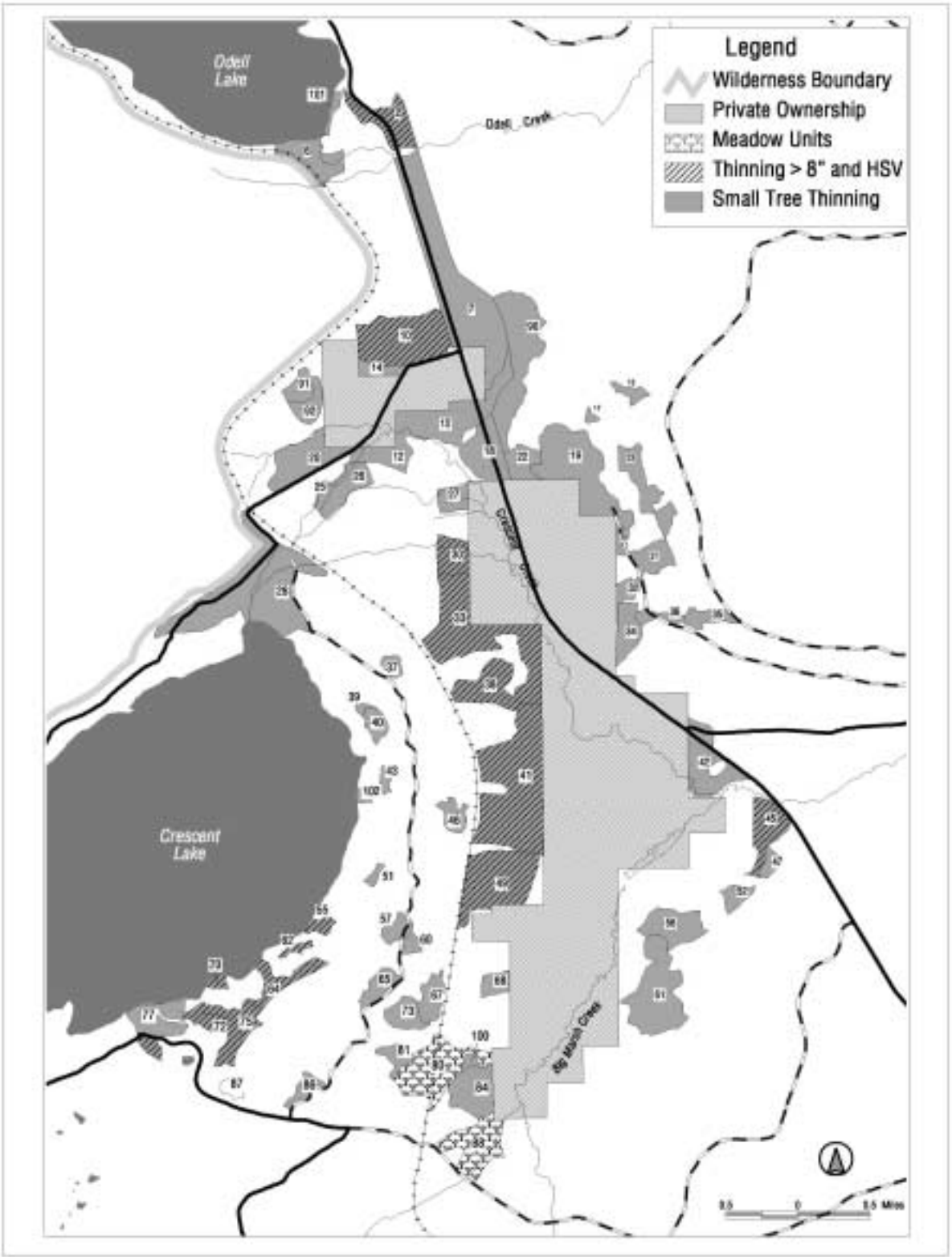


Figure 6. Alternative 4



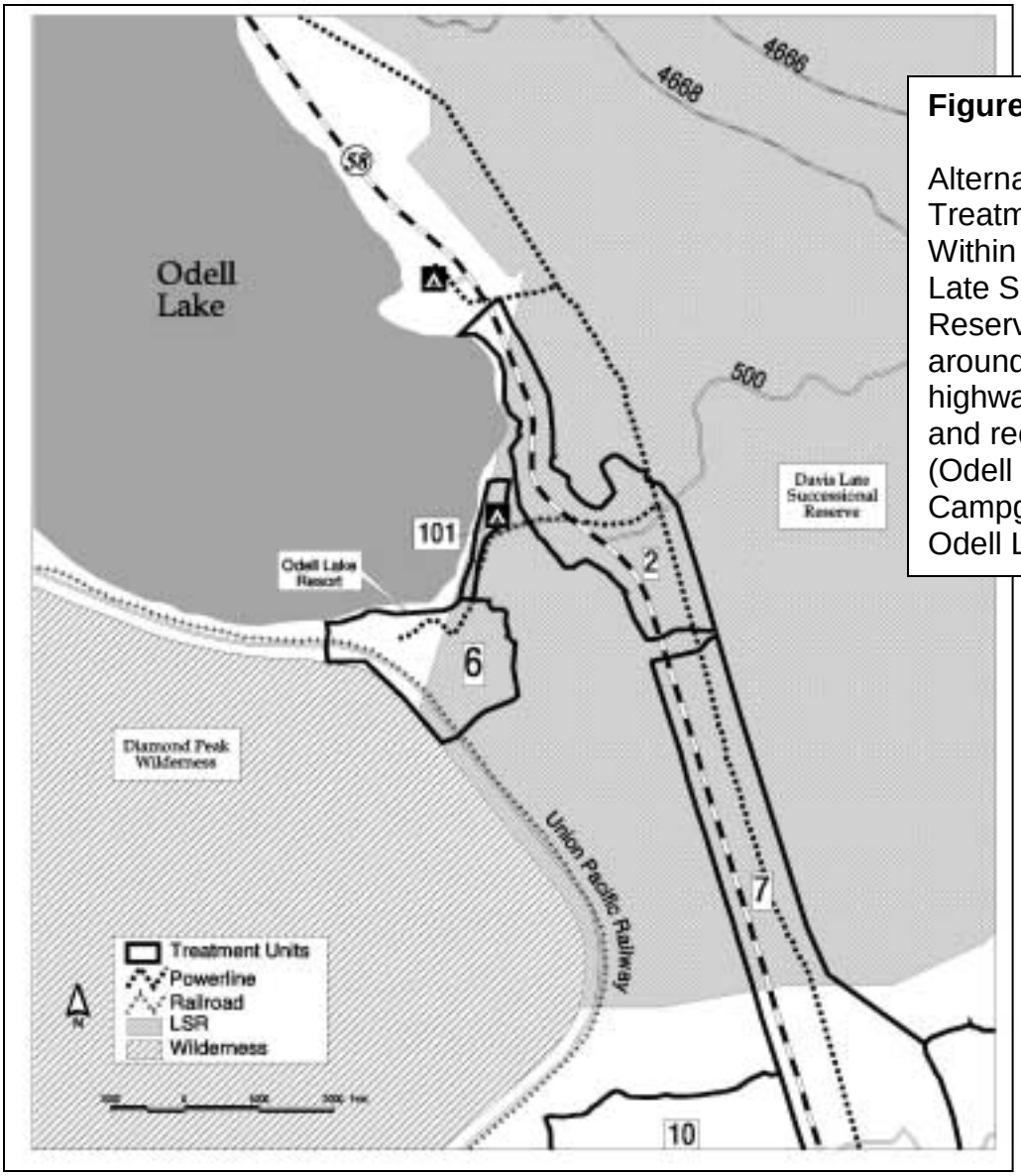


Figure 7.

Alternative 2 and 3: Treatment units Within the Davis Late Successional Reserve are located around major highway, powerline, and recreation areas (Odell Cr. Campground and Odell Lake Resort).

Similarities Between Action Alternatives

- Creating a secondary access road to the north end of Diamond View Estates, would involve improving an approximately 200-foot spur off Forest Road 4682.
- 15% retention in all treatment units except 33, 41, 49, and 92, where retention would be increased to 20% to maintain owl dispersal habitat and big game screening.

Temporary Roads

Temporary road construction is sometimes required to facilitate the economical harvest of trees from a particular harvest unit. Temporary roads would be constructed almost

exclusively on flat ground (slopes less than 10%) and excavation and construction of embankments would be negligible.

These temporary roads would be built to low construction standards, with constraints of grade, curve radius, compaction, surfacing, and width being tailored to the minimum capabilities of the intended user vehicles. By doing so, they would be constructed in a manner that would minimize disturbance and impacts to adjacent resources.

Temporary roads, by their nature, are not intended for mixed vehicle use, nor are they intended to remain as identifiable facilities after the administrative need for their use has ended. At the completion of harvest and post-harvest activities (treatment of residual slash), all temporary roads would be barricaded to eliminate motor vehicle access and would be subsoiled as part of post-harvest soil remediation activities to facilitate their return to vegetative productivity.

Description of Treatments

Thinning trees up to 8 inches diameter: Removal of trees 8 inches diameter or less through thinning from below, either in existing plantations (stands that have been replanted after harvest) or in stands that have not received regeneration harvest but have high densities of small trees. The objective is to reduce ladder fuels, competition among trees, and to improve the health and vigor of remaining trees. Thinning “from below” entails removal of trees, beginning with the smallest and moving toward larger trees, until the desired number of trees per acre (density) is met for the stand. If the desired density can be met by removing only smaller trees, then mid-sized and larger trees would not need to be removed. Depending on market conditions, some of the trees cut may have a commercial value. For example, trees between 2” and 7.9” diameter are sometimes suitable as posts and poles. There is also the possibility that some trees in the 6” to 7.9” size could be used for sawtimber.

Salvage: Salvage is shown for units where there is a likelihood of salvaging down lodgepole pine. Salvage would only take place where there are down trees that are excess to identified wildlife needs.

Larger Tree Thinning: This treatment would involve mainly thinning from below. In several of the lodgepole stands, some diseased and poor condition overstory trees would be removed also. The objectives are to reduce stand densities and modify fuel amounts and arrangements. The desired density would range between 60 and 160 square feet basal area per acre, depending on species composition, site productivity, and stand structure objectives. The focus would be on retaining healthy lodgepole pine, Engelmann spruce, ponderosa pine, and Douglas-fir. Species other than lodgepole pine will be favored where other species are well suited for the site. This treatment could benefit habitat conditions for late forest structure species that are associated with open, mature stands.

Prescribed Underburning: Underburning in stands with a fire-resistant overstory. Underburning may be a stand-alone treatment or may be combined with incidental removal of smaller (8-inch diameter or less) trees as needed to reduce concentrations of fuel and help prepare a resilient stand when burning is later applied.

Mowing: Mowing to reduce brush height and density in order to reduce ladder fuels. This treatment would be used primarily in conjunction with prescribed underburning, or where it would be done to reduce fuels created by tree cutting prescriptions.

Pruning: Where the limbs of trees are growing low enough to be ignited by a surface fire, pruning them up will reduce the risk of the fire reaching into the crowns of the trees.

Meadow Enhancement: Restoration and maintenance of natural meadows by removing small conifers, with the objective of reducing the number of trees growing into the meadow

openings. This treatment is keyed on wildlife habitat improvement, which will also result in reduced fire hazard. In some areas, piles of slash would be created on top of decadent willows. Burning the piles is expected to rejuvenate the willows by new sprouting.

K-V Projects

Money will be collected under the authority of the Kudsen/Vandenberg (KV) Act to complete certain projects such as required reforestation, proposed mitigation, enhancement and restoration projects in the vicinity of the harvest units. Required KV and mitigation measures have the highest priority for funding, but may not be funded solely through KV funds. For example, appropriated timber sale support funding may be used as well to insure that these requirements are accomplished. Enhancement projects may be funded through KV or through other means.

The following list is intended to serve as an overall guide for the project area. As specific timber sales are delineated within the project area, specific priorities may be adjusted to meet the specific needs for each sale area. This priority setting should be documented briefly in the implementation file for each timber sale. In addition, where funding of enhancement project relies on appropriated funding, not KV dollars, the district may place priority on funding other projects in other project areas, which could mean that a number of the enhancement project listed here may or may not be completed depending on District-wide priorities.

1. Reforestation site preparation (R)
2. Reforestation (R)
3. Soil restoration (primarily subsoiling) (M and E)
4. Noxious weed control (M)
5. Temporary road restoration (M)
6. Recreation site mitigation (stump hazard removal, cleanup, etc) (M)
7. Scenic views cleanup (M)
8. Snag creation to maintain existing levels (M)
9. Small tree thinning (E)
10. Small tree thinning slash cleanup (M)
11. Timber stand improvement (release/weeding) (E)
12. Noxious weed removal (pre-existing) (E)
13. Snag creation to improve conditions where existing snags are lacking (E)

Other enhancement projects may be implemented if additional funding exists after accomplishing the priority projects. These projects have equal priority in general. Depending on the particular site-specific circumstances of the project area, a particular project may have more emphasis than another. Details of these proposed activities are found in the KV portion of the project file.

Road improvement/closures	Great Grey Owl platforms
Soil restoration	Bat boxes
Recreation facility improvement	Bird boxes
Meadow Enhancement	Waterfowl structures

Project Design Considerations and Mitigation Measures included in all of the Action Alternatives

The Forest Service developed the following mitigation measures and design elements to be used as part of all of the action alternatives. All of the Alternatives would meet direction in relevant laws and policies, and the standards and guidelines in the Deschutes National Forest Land and Resource Management Plan as amended by the Northwest Forest Plan. In addition, the Alternatives either comply with the project design criteria for the Deschutes and Ochoco National Forests Programmatic Biological Assessment (2003 – 2006), or, if there are proposed deviations from the Biological Assessment, were reviewed by US Fish and Wildlife Service.

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). Mitigation of adverse effects would involve changing or modifying the actions described under the alternatives that may cause effects. There are many actions that the Forest Service may apply to enhance project design but may not be required to avoid or mitigate potentially significant impacts from implementing the selected Alternative; these are identified as recommendations. Best Management Practices are listed in Appendix B.

Soils

Harvest Operations

1. Use existing landing and skid trails where possible.
2. Design management practices (including burning and mowing operations) so that no more than 20 percent of an activity area may have detrimentally disturbed soil. After treatment, if post harvest monitoring shows an activity area to have more than 20 percent detrimental soil conditions then appropriate rehabilitation efforts will be initiated within these activity areas to reduce detrimental conditions to below 20 percent.
3. Use harvest methods designed to lessen impacts on the soil resource, including some or all of the following: 1) designate and/or use existing skid trails. 2) restrict skidders to trails and limit off trail travel of other harvest equipment. 3) limit use of ground-based mechanized equipment on slopes greater than 30 percent, longer than 200 feet, and making up more than 10 percent of the unit. If larger areas with slopes greater than 30 percent occur they will be evaluated with the soil scientist prior to harvest. 4) avoid harvest operations during times of the year when soils are extremely dry and subject to excessive soil displacement.

Burning Operations

4. Minimize fire line construction by using existing barriers for fire lines whenever possible. Fire line construction may be reduced by adjusting boundaries to take advantage of existing roads, skid trails, subsoiled areas, riparian areas, natural breaks such as rock outcrops, etc.
5. Burn plan objectives should strive to reduce litter and litter/duff, while not exposing bare mineral soil by the complete elimination of the duff layer.

Mowing Operations

6. Minimize soil displacement caused by excessive turning during the mowing operation.
7. Avoid operations during periods of excessive soil moisture conditions
8. When mowing operations are to occur on slopes greater then 30 percent, advise soil scientist for monitoring of soil disturbance.

Watershed and Fisheries

Activities within Riparian Reserves

9. Do not construct fire line in riparian areas when conducting prescribed burns. Prescribed burning is allowed to back burn through riparian reserves. Fire prescriptions will not exceed consumption of down material > 3" diameter.
10. Pumps will be refueled outside riparian areas. Pumps will also be placed in rubber/plastic retainers at the base to contain any accidental leaks or spills.
11. During prescribed burning operations, no bucking of down woody material that is instream or crosses any stream channel. Also, bucking of down wood within the riparian reserve needs to meet length requirements for coarse woody debris objectives.
12. Landings will not be located in Riparian Reserves.
13. Thinning riparian reserves will be limited to trees 4" diameter at breast height, or less, and no thinning will occur within 30 feet of stream banks.
14. Tree spacing will be kept to 6 feet between 30 and 150 feet from the stream bank.

Unit-Specific Guidelines

15. Unit 6 – No thinning or fuels treatment within 300 feet of Odell Creek.
16. Units 8, 12, 18 – thinning 4" dbh or less trees 0-100 feet of stream bank.
17. Unit 33 – No thinning or fuels treatment within 300 feet of Crescent Creek.
18. Units 33, 38, 41, 49, 67, 68, 81, 80, 100 – No equipment off current system roads.

Wildlife

Snag and Coarse Woody Debris

Dead wood management *within* the Davis LSR (applies to Unit 2, 6, 7, and 101):

Table 3-2 in the Davis LSR Assessment as amended (USFS 2002) specifies the levels of snags and down woody debris that will be retained to provide desired suitable and sustainable habitat conditions by plant association groups (PAG). Treated stands would retain dead wood that will be retained to provide desired suitable habitat conditions by PAG. Treated stands would retain dead wood that represents the species composition of the original stands. The material that is retained will be among the largest available. Adequate green tree replacements will be retained to provide future dead wood at levels specified in the table mentioned above. The following standards will also apply:

Management of dead wood in commercial thinning, selection cutting, shelterwood harvesting, firewood cutting, and underburning

19. All snags and down woody debris that meet the following size criteria will be retained in all decay class to the greatest extent possible during harvest and post-sale activity:

Mixed conifer PAG:

Snags- > 12 – 20" dbh 3 – 9 per acre and > 20" dbh 0.75 – 2 per acre
Logs- > 15" diameter 5 – 14 per acre

Ponderosa PAG:

Snags- > 18 – 28" dbh 1 – 3 per acre and > 28" 1 – 5 per acre
Logs- > 20" diameter 5-14 whole trees per acre

Lodgepole Pine PAG:

Snags- > 11" dbh 12 – 27 per acre
Logs- > 11" diameter 10 – 12 whole trees per acre

20. If snags that meet the criteria described above must be felled to meet OSHA safety regulations, they should be left on site.

21. If treated stands are below the desired snag densities, snags will be created (or diseased and/or defective trees retained) to accomplish this level.

22. If trees are being felled to meet stand health objectives, whole trees that are among the largest felled should be left on site at levels specified in Table 3-2 of the Davis LSR Assessment as amended for suitable habitat. No live or dead trees should be felled with the sole objective of meeting down wood requirements. In other words, trees that need to be felled to meet desired basal area should be left on site rather than falling additional trees for down wood and taking the stand lower than the target basal areas.

Down Wood Management West of the Northwest Forest Plan Line

23. On average, leave a minimum of 120 linear feet of logs per acre > 16" in diameter and 16 feet long, or among the largest available, where existing prior to treatment. Within the lodgepole pine PAGs 120 – 160 lineal feet equates to 5 – 7 trees and within the ponderosa pine and mixed conifer PAGs 120 feet may require leaving 2 whole trees per acre. Retain at least one slash pile (5' X 10' X 10') of down logs and tree tops per acre during burning operations to maintain small mammal habitat.

24. Within riparian habitat, key elk areas, and marten habitat (mixed conifer, lodgepole pine, and mountain hemlock PAGs) where the down material is present prior to treatment, leave on average 300 lineal feet of down logs per acre of the largest material available. Within the lodgepole pine PAGs this would equate to about 12 trees per acre and within mixed conifer this would equate to about 4 trees per acre.

25. Decay class 1 and 2 down logs will be left, preferably the entire tree. Down woody material in advanced stages of decomposition will be left in all harvest units where available. This material should be scattered across the entire unit and left in clumps wherever possible.

26. If underburning is utilized as a post-treatment, use preventive measures such as hand lining or other methods to retain snags, down logs, and slash piles selected for retention during burning operations. At a minimum maintain 30 percent of the shrub component well distributed across the unit.

27. Retention areas should be a minimum of 20 feet by 20 feet to provide big game forage, small mammal habitat, and nest substrate for resident and migratory birds.

Snag Management West of the Northwest Forest Plan Line

28. Lodgepole and Mixed Conifer Snags

Leave an average of 4.0 – 4.5 snags per acre distributed throughout the unit. Snags should be selected based on the following criteria: > 12" dbh and > 20 feet in height, the tallest trees preferred. If > 12" dbh trees are not available prior to harvest activities, select among the largest available.

29. Ponderosa Snags

Sufficient trees to serve as green tree replacements will remain in the units following harvest and post sale activities. Retain all ponderosa pine snags > 16" dbh. If 4 ponderosa pine snags per acre > 16" do not exist, retain those of the largest available.

30. Nesting, Roosting, and Foraging Habitat

Retain all existing snags in a manner that does not pose a safety hazard to forest workers during harvest operations.

Survey and Manage Species

31. Manage known sites of the Crater Lake Tightcoil snail (Pristiloma arcticum crateris) and conduct equivalent effort surveys consistent with the specifications published in the Supplemental Environmental Impact Statement for Amendment to the Survey and Manage, Protection Buffer, and Other Mitigating Measures Standards and Guidelines Record of Decision (USDA and USDA 2001).

32. Maintain snags at the 100 percent potential population level for the white-headed woodpecker, black-back woodpecker, pygmy nuthatch, and flammulated owl identified in the Northwest Forest Plan as needing additional protection. This would require the retention or creation of 4.0 snags/acre in mixed conifer and ponderosa pine forests and 2.6 snags/acre in lodgepole pine forests.

33. Protect sites commonly used by bats (fringed myotis, silver-haired myotis, long-eared myotis, long-legged myotis, and pallid bat) including caves, mines, snags, and decadent trees, wooden bridges, and old buildings. If caves or mines are discovered, conduct surveys to determine species presence or assume the species is present. Timber harvest would be prohibited within 250 feet of the site and management direction would be developed as needed to protect the site.

Threatened and Endangered Species and Forest Plan Standards and Guidelines

Bald Eagles

Bald Eagles (LRMP M3-15, 24 and 2003-2006 Programmatic Biological Assessment (USDA and USDI 1999).

34. Active nest sites will be protected from disturbing activities within 0.25 mile non line of-sight and 0.50 mile line-of-sight of the nest by restricting site-disturbing operations during the period of January 1 – August 31. The seasonal restriction applies to hauling, timber harvest, prescribed burning, and/or pre-commercial thinning or any additional activity determined to be potentially disturbing by the district wildlife biologist. This measure will apply to the following areas: Those portions of Units 64, 72, 75, and 78 that are east of Forest Road 6000290. The remainder of all harvest units and access roads for hauling would have no seasonal restriction unless new nests are discovered.

35. All snags that are eagle perches within 1650' of nests or roosts should be preserved. In addition, all snags utilized for roosting or foraging within nesting territories or communal roosts should be protected.

36. Any silvicultural operation or prescribed fire treatments that occur within BEMAs will be in compliance with the goals and recommendations identified in the site specific management plan for the "Crescent and Odell Lakes Bald Eagle Management Area and Nest Site Plans" (USFS 1998)

37. Any silvicultural or prescribed fire treatments that occur within the Davis LSR will be in compliance with the objectives and management options identified in the Davis Late-Successional Reserve Assessment (USFS 1995, amended 2002).

38. Post-sale burning activity of slash in winter roosting habitat will meet the following on 95% of the unit (where conditions exist following harvest treatment) to accomplish resource objectives for stand management: Retain an average of 180 – 274 TPA in sapling-sized trees (1.0 – 4.9") and pole-sized trees where the objective is to maintain multiple canopied forest. At this time no known night roosts have been identified in the project area.

39. A wildlife biologist and silviculturist would assist the marking crews in identifying resource objectives within the BEMAs.

40. Bald eagle habitat objectives will be included in the burn plans that affect BEMAs, winter roosting habitat, and/or individual eagles. A wildlife biologist should be available during burning operations to monitor bald eagle response to the activity.

Northern Spotted Owl

41. In nesting, roosting, and foraging (NRF) habitat within the Davis LSR, silvicultural treatments will be designed such that treated stands retain the highest quality of spotted owl habitat possible while accomplishing risk reduction objectives. Where single story treatments are proposed within BEMAs, all NRF stands would maintain dispersal capability after the completion of all silvicultural and fire activities. The rare removal of trees greater than 21" dbh would only occur under very limited circumstances such as: removing mistletoe infected trees, in stands with stocking level above Upper Management Zone (UMZ) some of the larger trees may be removed, in mixed species stands where true fir are removed to reduce host trees for spruce budworm, and/or to promote multi-storied stands for great gray or spotted owl habitat.

42. For NRF habitat outside the Davis LSR, silvicultural and/or fuels treatments will be designed such that treated stands at a minimum remain functional spotted owl dispersal habitat.

43. No harvest treatments will occur in spotted owl NRF habitat within 1.2 miles of any known spotted owl activity center.

44. No timber harvest activities including road construction and/or burning activities may occur within 0.25 mile of a known spotted owl activity center during the breeding season of March 1 – September 30 unless it is determined through surveys that the pair was non-nesting or the nesting attempt failed.

45. Current spotted owl surveys conducted to Forest Service protocol have not been completed for the entire project area. Previous surveys have been conducted in portions of the project area that overlap the Baja 58 and Seven Buttes project areas. In 2004, surveys will be needed along Highway 58 adjacent to Odell Lake to complete a two-year six visit survey to protocol. A limited operating period will be in effect prohibiting all logging and road construction activities from March 1 through September 30 for the following harvest units until a two-year six visit survey has been completed: Units 2 and 6.

46. Within NRF stands, post-sale precommercial thinning treatments and understory burning will meet the following specifications: retain an average of 50 TPA of pole-sized trees within stands moved toward single-story objective. Favor the retention of Douglas-fir and ponderosa pine but retain the original species mix.

Wolverine

47. There are no documented wolverine denning sites on the Crescent Ranger District. In the event a natal den is discovered or suspected before or during harvest operations, the den will be protected from disturbing activities within a two mile radius by restricting harvest operations during the period of February 1 – May 30.

Greater Sandhill Crane

48. If active sandhill crane nests are discovered, sites will be protected from disturbing activities within 0.25 miles of the nest during the period of March 1 – August 31.

Osprey

49. (LRMP WL-2) Active osprey nest sites will be protected by maintaining the forested character of an area at least 300 feet in radius around the nest. At least four dominant overstory trees per acre, favoring ponderosa pine, will be maintained in the area to serve as nest and perch trees.

50. (LRMP WL-3) Active nest sites should be protected from disturbing activities within 0.25 mile (one mile for the use of explosives) of the nest by restricting site disturbing operations during the period of April 1 – August 31. The seasonal restriction applies to timber harvest, precommercial thinning, and/or prescribed burning operations. A nest site may be considered inactive for the year if nesting activity is not evident by May 15. **This limited operating period restriction applies to all or portions of the following units: 2, 6, 51, 72, 77, 78, 85, 87, and 101.**

Northern Goshawk

51. (LRMP WL-9, 10, 11, and 12) For existing and newly discovered nest sites, the following mitigation measures will apply:

52. Harvest will be deferred in 25 acres of the most suitable nesting habitat surrounding the nest trees(s).

53. A 400 acre post-fledgling area will be established around the nest site. Harvest activities may occur in this area, however, late and old structured stands should be maintained and younger stands enhanced to move them towards a late-successional forested condition.

54. Locating new roads within a nest stand will be avoided. Active nest sites should be protected from disturbance between March 1 and August 31. A nest site would be considered inactive for the year if nesting activity is not evident by May 15. **The limited operating period restriction applies to all or portions of the following treatment units: 78, 79, 85, and 87.**

Elk and Mule Deer

55. Hiding areas should be present over at least 30 percent of the National Forest land in each watershed. For an area to be suitable as hiding cover a stand must be at least six acres in size capable of hiding 90 percent of a standing deer or elk from view of a human from a distance of 200 feet or a minimum 6 acre stand with a stand height of six feet for deer and 10 feet for elk that has not been thinned in the last 15 – 20 years. Hiding areas will be dispersed throughout the watershed.

56. Within Key Elk Area (WL 50), thermal cover must be present over at least 20 percent of National Forest Land in each key area. For a stand to quality as thermal cover, it must be at least 10 acres in size with trees 40 feet or taller in height. Canopy cover should be maintained at the highest percentage possible that will retain healthy stand conditions with low risk of catastrophic damage to insects or disease.

57. Within units 33, 41, and 49 retain at least 20 percent of each units' acreage in unthinned clumps to provide dense cover blocks for deer and elk and dispersing northern spotted owl. Clump size should range from 1- 6 acres and be well distributed across each treatment unit. These units were selected because of their large acreage size and the amount of habitat fragmentation that has already occurred nearby.

58. In areas used for mule deer fawning and elk calving, seasonal restrictions will apply from May 1 to June 30. These areas are typically in or very near to riparian areas. **This limited operating period restriction will apply to the following units: 6, northern ¼ of 7, 8, 12, 14, 18, 25, 26, 27, 30, 33, 38, 41, 42, 45, 47, 49, 68, 80, 88, 90, 91, 92.**

American Marten

59. Retain at least one small (5' tall, 10' wide and 10' long) grapple pile of down logs, treetops, or other material per acre after timber harvest and/or fuels reduction operations in all treatment units. These structures will provide resting sites for marten and serve as suitable habitat for small mammals that are preyed upon by marten.

Great Gray Owls

60. Active nest sites will be protected by maintaining a forested stand at least 30 acres in size to include the nest and adjacent forested riparian or meadow habitat. A minimum 300-foot forested buffer would also be retained between the nest and an opening. A 0.25-mile protection zone would be established around known great gray owl nest sites.

61. Active nest sites will be protected from disturbing activities within 0.25 mile of the nest by restricting operations during the period of March 1 to June 30. A nest site may be considered inactive for the year infesting activity is not evident by May 15. **A limited operating restricted period will be in effect for the southern ½ of Unit 80.**

Great Blue Herons

62. The vegetative characteristic of heron rookeries will be protected and seasonal restrictions from disturbing activities should be in effect from March 1 to August 31 within a 0.25-mile radius around the nest tree(s) if the herons are documented to be nesting. There are no known great blue heron rookeries in the project area.

Other Wildlife Species Requiring Limited Operating Period Restrictions

63. Active roosts and nests sites shall be protected from disturbing activities such as timber harvest, road construction, and prescribed burning during their respective nesting season. This will apply to species listed as Management Indicator Species (MIS) or other species of concern. The following species were not mentioned in previous mitigation measures but are listed below with their respective restricted dates and affected distance zone. At the present time there are no known nests of any of these species within 0.50-mile boundary of the project area.

Golden eagle	February 1 – July 31	0.50 mile
Cooper's hawk	April 15 – August 31	0.25 mile
Sharp-shin hawk	April 15 – August 31	0.25 mile
Red-tail hawk	March 1 – August 31	0.25 mile
Flammulated owl	March 1 – August 31	0.25 mile
Pileated woodpecker	April 15 – July 15	0.25 mile
Northern three-toed woodpecker	April 15 – July 15	0.25 mile

Retention Areas

64. In all treatment units, a minimum of 15 percent of the planned acreage will be left untreated (thinning and/or underburning) to provide habitat diversity across the landscape. The following units will have 20% left untreated: 33, 41, 49, 92.

Special or Unique Habitats

65. Habitat for species associated with springs, seeps, cliffs, and talus will be protected during project development.

Protection of PETS species

66. A contract provision would be inserted into each timber sale contract that would provide protection for proposed, endangered, threatened, and sensitive wildlife species and federally proposed or designated critical habitat. This provision is designed to afford protection to those species that may be discovered or federally listed during the life of the timber sale contract.

Noxious Weeds

Required Mitigation

67. For forested vegetation management operations, use equipment cleaning contract provisions. Timber sale contracts, road packages, stewardship pilot projects, and service contracts are now required to include provisions to minimize the introduction and spread of Invasive Plants, pursuant to Executive Order 13112 dated February 3, 1999. Applies to all units that are covered in contracts.

68. Begin project operations (i.e. commercial and precommercial thinning, prescribed fire, machine and hand piling, mowing, etc.) in uninfested areas before operating in weed-infested areas. Begin project operations in units that are not listed in Table 2 of the Noxious Weed Risk Assessment (located in the project file).

69. To the extent feasible, during mowing and/or burning, avoid mowing over or lighting weed infested areas in units. Applies to all units with mowing or burning activities proposed where weeds occur.

70. To reduce the spread of introduction of noxious weeds in mowing units, leave a 15-20 foot untreated strip along unit edges that lie adjacent to roads. This is often where the greatest concentration of weed seedbank reserves is located; by leaving this strip alone, there will be fewer opportunities for weeds to spread. Applies to all units with mowing treatment proposed adjacent to roads.

71. Ensure that all Forest Service equipment and vehicles used in project activities are free of weed seed and propagules before entering the project area. Applies to all treatment units.

72. Clean equipment before leaving the unit, if operating in areas infested with weeds. Applies to units listed in Table 2 of the Noxious Weed Risk Assessment, located in the project file.

73. Inspect areas disturbed by project activities for at least three years after project activities are completed, document any newly discovered sites, and use appropriate methods to eradicate or control the weeds at those sites.

Recommendations

- Minimize soil disturbance and retain native vegetation in and around project activity areas to the maximum extent possible, consistent with project objectives.
- Where appropriate and practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g. road embankments and landings).
- In prescribed fire units, use appropriate preparation and suppression tactics to reduce disturbances to soil and vegetation.
- Provide information, training, and appropriate weed identification materials to people potentially involved in weed introduction, establishment, and spread. Educate them to an appropriate level in weed identification, biology, impacts, and effective prevention measures.
- Treat weeds in the project area, emphasizing treatment of weed infestations on existing landings, skid trails, and haul roads before activities commence. Applies to units listed in Table 2 of the Noxious Weed Risk Assessment with harvest treatments.
- Train contract administrators to identify noxious weeds and select lower risk sites for landings and ski trails.
- Encourage operators to maintain weed-free mill yards, equipment parking, and staging areas.
- Encourage public land users, before recreating on public lands, to inspect and clean motorized and mechanized trail vehicles of weeds and weed seeds.
- Periodically inspect for weeds in all campground, trailheads, and recreation areas that are open to public vehicle use and treat infestations.
- Maintain areas of concentrated public use in a weed-free condition. Consider high-use recreation areas as high priority for weed eradication.
- Post weed awareness messages and prevention practices at strategic locations such as campgrounds, trailheads, roads, boat launches, and forest portals.
- Periodically inspect system roads and rights-of-way for invasion of noxious weeds. Train road maintenance staff to recognize weeds and report locations to the noxious weed coordinator.
- Treat weeds in road decommissioning and reclamation projects before roads are made impassable. Reinspect and follow up based on initial inspection and documentation.

Cultural Resources

74. Mitigation Measures have been identified for proposed treatments in four of the proposed activity units. Three eligible or unevaluated sites are involved in these

proposed units. These mitigation measures vary according to the site location and proposed treatment, but generally the primary strategy is avoidance of the sites. In some cases this involves revising the unit boundary to exclude the site or flagging the site for avoidance within the unit. Slash piles will also be placed outside of site boundaries.

Recreation and Scenic Views

Recreation Sites

75. Within affected recreation sites, harvest activities would occur outside of the summer recreation season. The summer recreation season is considered to be from Memorial Day weekend through Labor Day weekend.

Visual Corridors

76. Skid trails should be designed to minimize their visibility from the highways. Seek opportunities to place trails where a cut or fill situation along the affected roadway will screen the skid trail. Other topographic features may help block views to trails.

77. Landings should be placed to minimize their visibility to travelers. Use existing disturbed areas such as old landings and roads.

78. Visible slash should be piled and disposed of, or utilized on skid trails to restore their original appearance, i.e. ground litter.

79. Stumps visible from sensitive roadways and recreation sites should be cut low and angled away from the road so that the face is not visible from the road.

80. Along major roadways, tags, ribbons, boundary signs, and other means of designating activity areas will be removed when treatment is completed. Trees designated as leave trees would be marked on side of the tree facing away from scenic corridor.

Affected Environment and Environmental Consequences

This section of the environmental assessment considers the environmental consequences of implementation of the various alternatives. The effects may be direct, indirect, or cumulative.

This EA incorporates the Specialist Reports in the Project Record (40 CFR 1502.21). These Specialist Reports contain the detailed data, methodologies, analyses, conclusions, maps, references, and technical documentation that the resource specialist relied upon to reach the conclusions in this EA. Reports in the Project Record include Botany, Heritage, Fisheries, Wildlife, Soil and Water, and Fire/Fuels.

Discussion of Effects – Key Issues

FIRE HAZARD AND SILVICULTURAL CONDITION

Fire Hazard

In reference from "A Report to the Council of Western State Foresters – Fire in the West – The Wildland Urban Interface Fire Problem" dated September 18, 2000, the project area is described as fitting the definition of an Urban Wildland Interface Community. Under this definition, "the urban Wildland interface community exists where humans and their development meet or intermix with Wildland fuel." Several categories of communities meet this description.

The project area is best described as a Category 2- Intermix Community. The intermix community exists where structures are scattered throughout a Wildland area. There is no clear line of demarcation; Wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres. Fire protection districts funded by various taxing authorities normally provide life and property fire protection and may also have wildland fire protection responsibilities. An alternative definition of intermix community emphasizes a population density of between 28 – 250 people per square mile.

After nearly a century of wildland fire suppression, forested stands throughout the analysis area contain high levels of fuel loads that in many areas exceed the historic range of variability. The result is an increase in the number of acres characterized by conditions that enable fires to ignite easily, burn with greater intensity and severity, and spread more rapidly and extensively.

Much of the project area is dominated by lodgepole pine with dense understories. These understories provide an aerial fuel component that provides a ladder of available fuel, enabling fire to move from the surface fuels to the canopy, thus resulting in passive or active crown fire. Stand densities associated with many stands in the project area provide a high probability of sustained crown fire under typical summer weather conditions.

To obtain and verify current conditions in the project area several ground reconnaissance have been performed as well as review of aerial photos, Geographical Information System (GIS) data, and past activity records. From a fire and fuels management perspective several key elements receive focused attention to adequately describe current condition.

Assumptions and Rationale

During the development of proposed unit treatments and the treatment effects analysis the following assumptions were made:

- Human populations in Crescent Lake Oregon will continue to expand at or near the current growth rates, filling in open spaces within the existing community and reaching out into current wildlands with new houses and subdivisions.
- The concerns regarding fire movement across property lines goes both ways; from the federal lands to the private and from the private onto the federal.
- Wildland fire will not be eradicated in these ecosystems. A successful strategy will be built upon designing a vegetative environment, including species and structural characteristics that will produce desired, safely manageable fire behavior in the event of an unplanned ignition.
- There are no communities that are completely "fire safe." Certain combinations of ignition, fuel moisture in the live and dead vegetation, wind, and relative humidity can combine under extreme circumstances to threaten any community.
- A reasonable target is for firefighter safety and community protection under 90th percentile weather conditions.
- Weather conditions at the 90th percentile are defined as the combination of temperature, relative humidity, and wind speed on a summer day that is warmer, drier, and windier than 90% of all other recorded summer days. "Fire season" is defined as the 122-day period between June 1st and September 30th, during which most fires and acres burn. Under 90th percentile conditions, there will be about 12 days on average that are hotter, drier, and windier than those 90th percentile conditions.
- Public and firefighter safety is the top priority in fuels and fire management. Treatments in the wildland urban interface will focus on creating a safe working environment for fire suppression forces.
- Ground suppression forces can operate safely adjacent to flames that are 4 feet in length and less. Extreme fire behavior, including crown fire, rapid surface spread and long range spotting, create an unsafe environment for firefighters and the public.
- Fuels treatments on federal lands alone will rarely improve the chances for safe and successful fire suppression if the homes to be protected are surrounded by fuel on the private property, and the structure itself is constructed of extremely flammable materials. The most effective strategy is to have a fire safe structure, surrounded by vegetation on the private property that will burn with low intensities, surrounded by wildlands (regardless of ownership) that are managed for low intensity fire behavior.
- The area adjacent to homes and communities is valued for a variety of reasons, including wildlife habitat, unique vegetative communities, visual quality and recreational opportunities among others. Any management done in the name of hazardous fuels reduction in that zone must also consider the other objectives.

Existing Condition

The project area is characterized as forested with stands comprised of mixed conifer, lodgepole pine, and a few scattered stands of ponderosa pine. The exclusion of disturbance in the majority of these stands has allowed the establishment of multiple understory layers. The predominate brush species in the project area tends to be bitterbrush with some manzanita and caenothus.

Public use in the project area includes both seasonal and year-round occupancy. Presently, there are several residential subdivisions that provide year-round dwellings as well as summer home opportunities. These subdivisions have approximately 18 miles of property lines adjacent to Forest Service land and are forested with lot sizes ranging from 1/2 to several acres. Seasonal use in the area includes camping at designated campgrounds as well as numerous dispersed sites, and hunting and fishing at Crescent and Odell lakes.

The road system within the project area provides access for subdivision residents and visitors, forest users, and associated utility service needs. State Highway 58 is a major transportation corridor that provides a primary connection between the Willamette Valley and Eastern Oregon. The Crescent, Crescent Lake, and Chemult Rural Fire Protection Districts provide structural fire protection, and Walker Range Fire Patrol Association (WRFPA) protects forested private lands. Numerous access routes and driveways are narrow, overgrown with vegetation, lack turning radius or turnarounds, and are impassable to fire suppression apparatus.

Topography in the project area is generally flat with gentle slopes. The primary landform features are Crescent Lake, Crescent Creek, Odell Lake, and Odell Creek. Elevations range from 4,700 to 5,100 feet above sea level. The effects of the Cascade Mountains are the primary influence on weather conditions in the project area. This results in semi-arid conditions and marine influenced general wind patterns from the northwest and southwest.

Local wind patterns tend to be diurnal, generating strong daytime up-drainage and moderate nighttime down-drainage air movement. The effects of the general marine (NW/SW) winds often combine and accelerate the effects of the local winds to produce "gusty conditions." Due to the generally flat drainage location, the project area is prone to seasonal wind events resulting in localized vegetation disturbance (windthrow). The project area is known to be influenced by stagnant cold-air during the winter season which contributes to areas dominated by lodgepole.

Other effects of the winter season include substantial snow breakage and freeze damage to vegetation. During the summer season the area typically experiences temperatures above 80 degrees, and relative humidity's of less than 20%. The summer "fire season" can be described as being 100 to 130 days in duration.

Weather

Historical weather data was collected from the Black Rock Weather Station (353342) and contains records from 1991 through 2001 (approximately 11 years). Weather data was then analyzed and modeled for the 90th percentile day weather observations. Given the understanding of these existing conditions, it is possible to interpret fire behavior and subsequent fire effects within the project area. Table 4 expresses percentile weather output from Fire Family Plus.

Table 4. Fire Weather for Black Rock Station (353342).

Attribute		90th Percentile Weather
1 hour	(%)	4.5
10 hour	(%)	6.2
100 hour	(%)	11.3
Live Herb. Moisture	(%)	50
Live Wood Moisture	(%)	69.8
20' Wind	(mph)	7.7
Mid-Flame Wind	(mph)	2.3
Low RH	(%)	13
High Temp.	(Degrees)	87

1hr, 10 hr, 100 hr, and 1000 hr are time-lag fuel categories. These categories are based on fuel particle diameter, and represent the amount of time required to go from and initial moisture content to approximately 2/3 of the way to equilibrium with the ambient air humidity. The 1 hr time lag class is applied to particles between 0 and ¼ inches in diameter. 10-hour fuels are those between ¼ and 1

inch. 100-hour fuels are 1 to 3 inches in diameter, and 1000-hour fuels are greater than 3 inches in diameter.

The “herb” and “woody” categories express the moisture content of herbaceous and woody live fuels, respectively. It is a measurement of the relative weight of the water to the total weight of the oven dry biomass.

The “wind” value is the windspeed measured at 20 feet above the tallest vegetation. For fire behavior calculations, a correction factor is applied to the 20 foot wind to account for the sheltering of vegetation at the mid flame level.

The temperature, relative humidity, and wind speeds are measured once a day at 1:00 in the afternoon.

Fire Regimes

Fire regimes describe the role fire plays in an ecosystem in terms of frequency and severity. Fire regimes are based on environmental gradients of temperature and moisture, similar to the way plant associations are grouped. The assignment of a specific fire regime to a specific seral/structure stage is a product of fire ecology literature, historical fire records and local fire experience. There are three levels of fire severity: non-lethal (low) severity, mixed (moderate) severity, and stand replacement (high) severity. Table 5 describes fire severities.

Table 5. Fire Severity Descriptions

Fire Severity	Symbol	Description of Effects on Vegetation
Nonlethal	NL	More than 70% of the basal area or more than 90% of the canopy cover that existed prior to the fire still remains after the fire.
Mixed	M	Fires of intermediate effects, often resulting from a mosaic of varying conditions.
Stand Replacement	SR	Less than 20% of the basal area or less than 10% of the canopy cover of the overstory remains after the fire.

Fire Frequencies

There is a historic fire frequency associated with each level of severity. Frequency is divided into four categories, and each category is associated with a mean fire interval. Mean fire interval is the average number of years between two successive fire events in a given area. Table 6 describes fire frequencies.

Table 6. Fire Frequencies

Fire Frequency	Symbol	Mean Fire Interval
Very Frequent	VF	Less than 25 years
Frequent	F	26 - 75 years
Infrequent	I	76 - 150 years
Very Infrequent	VI	151 – 300 years

The predominant plant association groups can be characterized as Fire Regime Group III, mixed severity fire with a mean fire return interval between 35 and 100 years (3484 acres), and Fire Regime

Group IV, stand replacement severity fire with a mean fire return interval between 35 and 100 years (5607 acres). Historically, the fires were mixed and stand replacement fires, which contributed to fragmenting forested areas with varying seral/structure stages. Fire exclusion has changed the vegetation and structure. Currently much of the landscape is dominated by dense thickets and storied structures that are more continuous with fewer breaks in the canopy (late-stage lodgepole pine). Historically there were more blocks of early and mid-staged lodgepole across the landscape that broke up the continuity of the late stage stands.

The area also contains a small amount of forest characterized as Fire Regime Group I, low severity fire with a mean fire return interval between 0 and 35 years (276 acres). Historically, the fires were mostly low severity fires, which maintained the open park-like stands dominated by ponderosa pine. Fire exclusion has changed the vegetation and structure. Currently, these stands are dominated by dense thickets and storied structures with a significant increase in the Douglas-fir component.

The fire regime groups are an extension of the plant association groups and have been identified for the area. Table 7 describes Fire Regime Groups.

Table 7. Natural Historic Fire Regime Groups

Fire Regime Group	Acres	PAG	Fire Return Interval	Fire Severity
I	276	Pine Types	0-35	Low
III	3484	Mtn. Hemlock	35-100	Mixed
IV	5607	Lodgepole	35-100	Stand Replacement

The Deschutes National Forest has designated riparian (RIP) zones as a separate plant association group. It is likely that these riparian PAGs have similar natural fire regimes as the PAGs that surround them. With the limited amount of information available it would be difficult to quantify the existing fire regime groups within these riparian zones. There are limited treatments (mostly small diameter tree thinning, pruning, and handpiling) proposed in some of these riparian zones that is accounted for in the effects analysis.

Fire Occurrence

The Fire Occurrence Rate (FOR) is the probability of a fire occurring on a given area per year. For comparison reasons, it is referred to in terms of fires per thousand acres per year. The FOR is usually a fraction, with zero being the low end and 1 the high end of the range. Numbers close to zero indicate a low fire probability and numbers closer to one are indicative of a high fire probability.

The FOR for the Crescent Lake Wildland Urban Interface analysis area was figured by counting the number of recorded fires occurring from 1941 to 2001 within the area. The FOR is:

161 Fires / 10.1 thousand acres / 60 years = 0.2656 FOR

In other words, there is a 26.6 % chance of fire occurring within any 1000-acre block of the Crescent WUI area per year.

Surface Fuels

Existing fuel conditions have been quantified and qualified (modeled) to estimate the current potential of surface fire behavior. Fuel Models were selected from the 13 Fire Behavior Prediction System (FBPS) models that are organized into four groups: grass, shrub, timber, and slash. They are further described by fuel load <3-inch, dead fuel load ¼ inch, live fuel load of foliage and fuel bed depth (Anderson 1982).

These fuel models only account for the surface fuels by size classification and tons per acre of available fuel. Much of the project area is dominated by lodgepole pine with dense understories. These understories provide an aerial fuel component that serves as a ladder of available fuel, which enables fire to move from the surface fuels to the canopy, thus resulting in passive, active, or independent crown fire. Lodgepole pine is a thin barked non-fire tolerant species. Densities associated with many stands in the project area provide a high probability of sustained crown fire under typical summer weather conditions.

The following surface fuel models were used to characterize the range of surface fuel conditions in the project area:

Table 8. Fuels Models within Project Area

Fuel Model	Acres	Description
1	**971**	Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third the area. Annual and perennial grasses are included in this fuel model. Typically total fuel load (<3") live and dead is about 0.74 tons per acre. Total fuel bed depth is 1.0'.
5	**173**	Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and grasses or the forbs in the understory. The fires are generally not very intense because surface fuel loads are light, the shrubs are young with little dead material, and the foliage contains little volume material. Usually shrubs are short and almost totally cover the area. Young green stands with no dead wood would qualify: laurel, vine maple, alder, or even chaparral, manzanita, or chamise. Young green stand may be up to 6 feet high but have poor burning properties because of live vegetation. Typically total fuel load (<3") live and dead is about 3.5 tons per acre. Total fuel bed depth is 2.0'.
6	**93**	Fires carry through the shrub layer where foliage is more flammable than fuel model 5, but this requires moderate winds, greater than 8 mph at mid-flame height. Fire will drop to the ground at low wind speeds or at openings in the stand. The shrubs are older, but not as tall as shrub types of fuel model 4, nor do they contain as much fuel as fuel model 4. This fuel model considers a broad range of shrub conditions. Typically total fuel load (<3") live and dead is about 6.0 tons per acre. Total fuel bed depth is 2.5'.
8	**2,680**	Slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter an occasional "jackpot" or heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidities, and high winds do the fuels pose a fire hazard. Closed canopy stands of short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Representative conifer types are white pine, and lodgepole pine, spruce, fir and larch. Typically total fuel load (<3") live and dead is about 5.0 tons per acre. Total fuel bed depth is 0.2'.
9	**4,605**	Fires run through the surface litter faster than model 8 and have longer flame length. Both long-needle conifer stands and hardwood stands are typical. Closed stands of long-needle pine like Ponderosa, Jeffery, and red pines are grouped in this model. Concentrations of down-dead woody material will contribute to possible torching out of trees, spotting, and crowning. Typically total fuel load (<3") live and dead is about 3.5 tons per acre. Total fuel bed depth is 0.2'.
10	**1,234**	The fires burn in the surface fuels with greater fire intensity than the other timber litter models. Dead-down fuels include greater quantities of three inch or larger limb wood resulting from over maturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting, and torching of individual trees is more frequent in this fuel situation, leading to potential fire control difficulties. Any forest type may be considered if heavy down material is present; examples are insect or disease-ridden stands, wind-thrown stands, overmature situations with deadfall, and aged light thinning or partial-cut slash. Typically, total fuel load (< 3") live and dead is about 12 tons per acre. Total fuel bed depth is 1.0".

Fuel Model	Acres	Description
11	**2,758**	Fires are fairly active in the slash and herbaceous material intermixed with the slash. The spacing of the rather light fuel load, shading from the overstory, or the aging of fine fuels can contribute to limiting the fire potential. Light partial cuts or thinning operations in mixed conifer stands are considered. Clearcut operations generally produce more slash than represented here. Typically total fuel load (<3") live and dead is about 11.5 tons per acre. Total fuel bed depth is 1.0'.

Fire Behavior

Modeling of potential fire behavior in the WUI was done using both surface and crown fire modeling approaches.

Potential fire behavior is the central concern in the wildland urban interface. Models can be used to reflect current and desired fuels conditions in different ecosystems. The models themselves are based on assumptions of contiguous fuels and steady weather conditions which are rarely found in wildland ecosystems. While the fire behavior prediction models are generally accurate, they become less reliable toward the more extreme end of the spectrum of all potential fire behavior. Historically, most extreme fire behavior observed in the central Oregon area has burned with greater speed and intensity than fire behavior models have predicted. The models are a good tool for relative comparisons, but are not infallible.

The Nexus Fire Behavior and Hazard Assessment System is an EXCEL spreadsheet that links surface and crown fuels to predict a wide range of fire behavior - surface, crown, and transition. For the Crescent Lake WUI planning area, NEXUS has been used to evaluate alternative treatments for reducing risk of crown fire by exploring the influence of different factors on predicted fire behavior and crowning potential and by assessing surface and canopy fuels.

Surface fire behavior has been estimated by modeling existing fuel and 90th percentile weather data using the NEXUS fire behavior prediction program. The multiplier default settings were used in all modeling runs with the exception of fuel models 5 and 6. The surface load and depth has been adjusted for these fuel models to 0.6 and 1.3 respectively. During field reconnaissance it was observed that fuel model 5 typically covered 60% of the area where it occurs and fuel model 6 fuel loads are adjusted adding 30% to account for pine needle cast and small branch material that exists in bitterbrush crowns.

Surface fire behavior modeling is used exclusively for fuel model 1 areas as most of the vegetation there is steppe or woodland vegetation and current models for crown fire tend to focus on forested ecosystems. Table 9 displays surface fire behavior associated with fuel models in the project area.

Table 9. Potential Surface Fire Behavior at 90th Percentile Weather Conditions

Fuel Model	Existing Acres	Flame Length (ft)	Rate of Spread (ch/hr)
1	971	2.8	31.9
5	173	3.6	11.3
6	93	5.9	22.3
8	2,680	.8	1.1
9	4,605	2.1	4.0
10	1,234	4.7	6.3
11	2,758	2.7	3.5

Canopy Fuels

Proposed units are stratified into 3 categories (low, moderate, and high) based on the amount of existing trees equal to or less than 5 inches dbh. A model stand for each density category has been developed using data from 30 stand exams as input into Fuels Management Analyst, Crown Mass. Table 10 displays densities and associated trees per acre.

Table 10. Densities by trees per acre for stand modeling

Density	Trees/Acre =<5"dbh
Low	0-999
Moderate	1000-1999
High	2000+

Proposed treatment units are assigned to density groups. Unit density was determined with information from stand exams, ground reconnaissance data, unit photos, aerial photos, and aerial photo interpreted information. The table below displays units by densities and provides total acres estimates for the amount of each density proposed for treatment.

Table 11. Unit Densities with Total Acres

Density	Unit Numbers	Total Acres
Low	29,30,80,84	201
Moderate	2,15,17,19,23,26,31,33,35,37, 38,40,43,45,46,49,51,52,57,58, 60,64,67,70,71,72,73,81,85,86, 87,88,89,91,92,100,101,102	1,380
High	6,7,10,12,14,18,20,22,25,27,28, 32,34,36,39,41,42,47,55,56,61, 62,66,68,75,76,77,79,90	1,870

The Fuels Specialist Report contains more detailed and extended data involved in the calculations of canopy and crown fuel loading. Based on the NEXUS program, the following conditions related to canopy fuels existing in the project area:

Low Density

Canopy Characteristics:

- Canopy Base Height – 10 feet
- Canopy Bulk Density – 00.36 lbs/ft^3
- Canopy Fuel Loading – 3.29 tons/acre.

Thresholds met or exceeded:

- Fuel Model 6 flame length of 7 feet exceeds the critical flame length of 5.3
- Areas with Fuel Model 6, the canopy base height is lower than the critical canopy base height.
- Fuel Model 6 torching Index of 6 mi/hour is less than the 90th percentile 20' windspeed of 7.7 mi/hr.

Other Areas of Concern:

- Fuel Model 5 and 10 require relatively moderate 20' windspeeds of nearly 16 and 10 mph respectively, to exceed the Torching Index threshold.

Moderate Density

Canopy Characteristics:
- Canopy Base Height – 11 feet
- Canopy Bulk Density - .0058 lbs/ft^3
- Canopy Fuel Loading – 5.15 tons/acre.

Thresholds met or exceeded:
- Fuel Model 6 flame length of 7 feet exceeds the critical flame length of 5.6 feet
- Areas with Fuel Model 6 has canopy base height lower than critical canopy base height.
- Fuel Model 6 torching index of 7 mi/hr is less than 90th percentile 20' windspeed of 7.7 mi/hr.

Other Areas of Concern
- Fuel Models 5 and 10 require relatively moderate 20' windspeeds of nearly 18 and 11 mph respectively, to exceed the torching index threshold.
- Relatively moderate 20' windspeeds can exceed the crowning index threshold of 17.4 mph.

High Density

Canopy Characteristics:
- Canopy Base Height – 5 feet
- Canopy Bulk Density - .0132 lbs/ft^3
- Canopy Fuel Loading – 9.05 tons/acre

Thresholds met or exceeded:

- Fuel Models 5, 6, and 10 flame lengths are of proportions that indicate crown fire for areas occupied by these fuel models. Critical flame length thresholds of 3.3 feet have been exceeded.
- In areas with fuel models 5, 6, and 10, the existing canopy base height of the stands are lower than the critical canopy base height.
- Fuel model 5, 6, and 10 torching index is less than 90th percentile 20' windspeed of 7.7 mi/hr.

Other areas of concern:

- The torching index for all fuel models, with the exception of fuel model 8, only require light to moderate 20' windspeeds to exceed torching index thresholds.
- Relatively light 20' windspeeds can exceed the crowning index threshold of 8.8 mph.
- Existing high-density stands are at the highest risk of crown fire. These crown fires will likely be active crown fires with the potential to burn across the landscape at high rates of spread. They will be dependent on wind and or slope and fuels (both surface and canopy fuels) to maintain moderate to high rates of spread. Spotting potential is high and will increase rates of spread. During 90th percentile weather conditions, crown fires will transition to surface fires only if they burn into stands with surface fuels and canopy bulk densities that are less conducive to supporting their forward rate of spread. Otherwise, they will remain crown fires until weather conditions no longer support such fire behavior.

Effects

Objectives of Fuels Treatments

Crown fires present special problems to fire managers. Crown fires are more difficult to control than surface fires. Their rate of spread is several times faster than surface fires (Rothermel 1983). Spotting is frequent and can occur over long distances. Larger flames from crown fires dictate larger firefighter safety zones (Butler and Cohen 1998). Spotting and increased radiation make structures more difficult

to defend from crown fire than surface fire (Butler and Cohen 1998). Effects of crown fire are more severe and lasting than surface fire. Near total tree mortality should be expected. Smoke production will be greater, and foliar nutrients may be lost from the site.

Crown fires can occur in a wide variety of forest types throughout the United States (Agee 1993). Increasingly, crown fires are taking place in forest types not historically prone to crown fires, such as ponderosa pine forests (Mutch and others 1993). A significant risk to life and property exists wherever forest stands prone to crown fire lie in proximity to residential or recreational development. Therefore, assessing the susceptibility of forest stands to crown fire and designing fuel and silvicultural treatments to reduce susceptibility have become priorities for local land management agencies.

Fuels treatments in the Crescent Lake WUI planning area are designed to reduce the risk of crown fire development by affecting one or more elements of the fuels complex that lead to crown fire development. These are surface fuel loading, canopy base height, and canopy bulk density. Surface fuel loading is the most widely understood of these three elements and consists of the downed woody and live fuel available to support the start and spread of fires and is usually expressed as tons per acre. The greater the fuel loading, the more intense the fire burns and the greater the associated flame lengths. Canopy base height is the distance between the surface fuels and the average bottom level of tree crowns and is usually expressed in feet. The greater the canopy base height, the longer the flame length needed to ignite the canopy. Canopy bulk density is the amount of canopy fuels within a given area and is usually expressed as pounds of foliage per cubic foot. The greater the canopy bulk density, the easier for crown fires to ignite and propagate.

Fuel treatments are designed to produce the following:

- Flame lengths of 4 feet or less (Agee et al. 2000)
- Crown base height of 6 feet or greater (Agee et al. 2000)
- Crown bulk density of 0.0023 lbs/ft^3 or less (Carlton 2001)

The Fire Behavior Prediction System Fuel Models most commonly associated with such low flame lengths are (Anderson 1982):

- 2 (timber or brush with grass understory),
- 5 (low brush)
- 8 (short needle conifer litter, light loading), and
- 9 (long needle conifer or hardwood litter).

The minimum crown base height needed varies depending on foliar moisture content. The crown bulk density at which crown fires will not initiate or spread is more difficult to define since it is more species specific, but current crown fire models use 0.0023 lbs per cubic foot (Carlton 2001). As a rough guide, this crown bulk density represents tree crowns that are just touching.

Alternative 1

Direct and Indirect Effects

Existing stands would remain in conditions conducive to crown fire development.

Current torching and crowning indexes would decline further as more acres would accumulate increased surface fuel loadings and canopy densities. Public and private ownerships remain at high risk to loss when wildfire occurs. No management activities other than custodial duties such as wildfire suppression would occur. Fuels reduction would only occur during wildfires. Fire intensity would likely be lethal to moderate-density and high-density stands with ladder fuels reaching into the overstory crowns. In lodgepole pine communities, a high intensity wildfire would likely be a stand-replacing event.

Improved safety areas for firefighter suppression activities and adequate public/firefighter evacuation routes would not be developed. The effectiveness of aerial delivered retardants into adjacent wildland/urban interface residential developments would continue to be limited due to existing canopy densities. Fire intensity and long range spotting from airborne embers will continue

to challenge suppression activities. The opportunity to expand fuel treatments to provide a more defensible Forest boundary would not occur. Heavy equipment would be required for fireline construction due to fire intensity and limited safe access.

Smoke from wildfires would likely have an adverse impact on surrounding communities. As surface fuels accumulate, smoke emissions from wildfire would continue to substantially degrade air quality with particulates of 10 microns or less.

Alternative 2

Direct and Indirect Effects

Small Tree Thinning treatments would occur on approximately 1,455 acres. Proposed understory thinning would raise the average canopy base heights within treated stands, increasing the stands resistance to crown fire development. A combination of Small Tree Thinning and Thinning would occur on approximately 1,175 acres. The combined thinning treatments would raise average canopy base heights and reduce canopy bulk density, increasing the stands resistance to crown fire development and spread. Thinning treatments and surface fuel treatments would reduce the amount of forested area at risk to crown fire within the wildland/urban interface area. Under this alternative, the total number of acres proposed for fuels treatments is approximately 3,550.

Alternative 3

Direct and Indirect Effects

Proposed fuels treatments and effects to fire behavior would be similar to Alternative 2 (Proposed Action). Small Tree Thinning treatments would occur on approximately 730 acres. A combination of Small Tree Thinning and Thinning treatments would occur on approximately 1,980 acres. In comparison to all action alternatives; this alternative proposes the most acres of combined Small Tree Thinning and Thinning treatments which would raise average canopy base heights and reduce canopy bulk densities, thus increasing the resistance to crown fire development and spread within treated stands. Under this alternative, the total number of acres proposed for fuels treatments is approximately 3,550.

Alternative 4

Direct and Indirect Effects

Proposed fuels treatments would be similar to the other action alternatives. Small Tree Thinning treatments would occur on approximately 1,565 acres. A combination of Small Tree Thinning and Thinning treatments would occur on approximately 955 acres. This alternative proposes the highest amount of Small Tree Thinning treatments, and the lowest amount of combined Small Tree Thinning and Thinning treatments. The Proposed thinning treatments would raise average canopy base heights and reduce canopy bulk densities, thus increasing the resistance to crown fire development and spread. Potential crown fire spread would be reduced only in areas treated with Thinning. Under this alternative, the total number of acres proposed for fuels treatments is approximately 3,340.

Common to all Action Alternatives

In all action alternatives, Thinning treatments and surface fuel treatments would reduce the amount of forested area at risk to crown fire within the wildland/urban interface area. This is especially true for areas containing surface fuel models 10 and 11. After treatment, surface fuels in most areas will be characterized as fuel model 8 and fuel model 9. Units treated with Small Tree Thinning having post treatment fuel models 8 and 9 would have Torching Index thresholds of 64 mph for fuel model

9, and thresholds unlikely to ever being exceeded (444 mph) for fuel model 8. The Crowning Index for units treated with Small Tree Thinning would range between 18 and 26 mph.

Units treated with Small Tree Thinning and Thinning would have Torching Index thresholds of approximately 89 mph for fuel model 9, and thresholds unlikely to ever being exceeded (508 mph) for fuel model 8. The Crowning Index for units treated with Small Tree Thinning and Thinning would range between 30 and 36 mph.

Any untreated areas, including retention areas in treatment units, would burn intensely, likely as active crown fire, increasing the probability of burning embers and spot fire development. In some areas, depending on shrub and other vegetative growth, wildfire risk reduction treatments would likely become less effective in as little as 5-10 years and ineffective in 10-20 years.

Safer areas for firefighter suppression activities and public/firefighter escape routes would be developed through fuels treatments. Aerial delivered retardants into treated areas would gain effectiveness because of open canopied stands. Potential fire intensity and long range spotting from airborne embers would be reduced. Hand crews effectiveness would increase during fire suppression activities under most circumstances in treated areas.

Proposed road construction and improvements would have the potential to improve response time of suppression resources to fire starts. This improvement in response time could, under average fire weather conditions, lead to reduced fire growth.

Cumulative Effects

Within the next five years, vegetation and fuels treatments could begin in the Baja 58 and Seven Buttes Return planning areas. The Baja 58 planning area is located south of Crescent Lake WUI planning area, and Seven Buttes Return overlaps the north end of Crescent Lake WUI planning area. Future vegetative and fuels treatments in these areas would further reduce the probability of large fire occurrence within the Crescent Lake WUI planning area. In contrast, further reduction in road densities associated with decommissioning roads will favor fire growth due to reduced accessibility, increased response times, and loss of pre-existing control lines.

Silvicultural Condition

Stand conditions were examined using the following sources: detailed stand attributing from 1995 and 2001 aerial photo interpretation; stand exams completed between 1995 and 1997; and site visits during the 2002 field season. Most forested stands in the planning area have two to three stories and have some medium to large trees present. Fire suppression and the absence of recent management have resulted in higher stand densities and a higher proportion of seedling, sapling, and pole size trees. The high density of trees makes stands more susceptible to insects and disease.

Conifer tree species in the planning area include lodgepole pine, ponderosa pine, sugar pine, western white pine, Engelmann spruce, white fir, Douglas-fir, and mountain hemlock. Plant Association Groups (PAGs) on National Forest System lands in the project area are displayed in Table 12. Over 5,600 acres (about 50% of National Forest System lands within the project area) are in the lodgepole pine PAGs. Stand structure varies from the simple, young stands of seedling and sapling size trees, also known as plantations, to complex, multistoried stands with trees ranging in size from small to large.

Table 12. Plant Association Groups, National Forest System Lands

PAG	Acres
Lodgepole Pine Dry	4956
Lodgepole Pine Wet	652
Mixed Conifer Dry	3290
Mixed Conifer Wet	149
Ponderosa Pine	276
Mountain Hemlock Dry	45
Wet Meadow	4
Riparian	643
Rock and Cinder	20

Effects

Alternative 1

The largest difference between the alternatives, including the No Action alternative is in the number of acres that would be treated with either larger tree thinning/salvage, or small tree thinning outside of plantations. No thinning would occur in Alternative 1, which would mean no reduction in the amount of stands at risk to loss from insects, disease, or wildfire; and no improvement in stand health conditions.

Alternatives 2, 3, 4

With any of the action alternatives, thinning of both small and larger trees will reduce competition between trees and improve the health and vigor of the remaining trees. Thinning will be mainly from below, which entails the removal of trees beginning with the smallest and moving toward trees of a larger size until the desired trees per acre and/or basal area are met for the stand. The healthiest and largest trees would remain, and a focus would be on retaining healthy lodgepole pine, Engelmann spruce, ponderosa pine, and Douglas-fir. Species other than lodgepole pine will be favored where other species are present and well suited to the site. This could improve habitat conditions for late forest structure species that are associated with more open, mature stands. In some lodgepole stands, some of the overstory trees (the larger trees) are diseased and in poor condition, and removal of these would improve development of the understory.

The major difference between the alternatives is in the number of acres outside of plantations that would be treated with larger tree thinning/salvage, and those that would only be treated with smaller tree thinning. Alternative 3 proposes the most larger tree thinning/salvage (2,460 acres), compared to 1,657 in Alternative 2, and 1,012 acres in Alternative 4. These are gross figures, unadjusted for retention or other leave areas.

These acres are now, or will be in a few years, high risk stands. That is, they have reached a density where tree growth or vigor have declined to a point where increased mortality occurs from either insects and/or disease, and are also susceptible to stand-replacement wildfire. Alternative 3 treats the most at-risk stands and also applies the treatment that best meets the need to reduce risk.

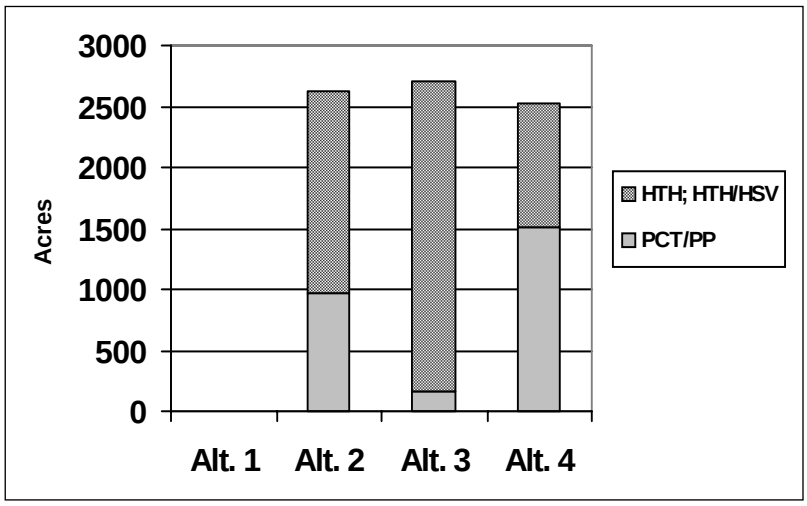


Figure 8. Ratio of Large Tree and Small Tree Thinning Outside of Plantations by Alternative

Some units in Alternative 2 and 4 will not have large tree thinning with the consequence of leaving the stands overstocked. Also, there would not be the opportunity to remove diseased trees that are greater than 8" diameter. The consequence of leaving diseased trees and leaving stocking above the desired level is that these stands are less healthy. The disease that is left in the stand can spread to other trees, and higher stocking levels will result in trees that are less vigorous and have less ability to resist insects and disease. Stocking that is above the desired level also results in a slightly higher fire hazard. The stands that are proposed for small thinning in Alternatives 2 and 4, (but proposed for thinning of all size classes in Alternative 3) will more quickly reach stocking levels that put them at a high risk for fire, insects and disease. The stands in the project area that would be treated with only small tree thinning instead of larger tree thinning would reach a high risk stocking level in 10 to 12 years instead of 20+ years.

Cumulative Effects

The current project area overlaps two other planning areas (Baja 58 and Seven Buttes). Vegetation treatments planned with these other projects, which are primarily thinning from below and treating slash, are planned for completion within the next three to eight years. These treatments will have a positive cumulative effect for forest health and fire hazard reduction, because more total acres in the Crescent Lake WUI planning area will be thinned, resulting in more stands with less disease and increased resistance to insects and disease, and decreased fire hazard. This is true for all action alternatives, but more positive effect when combined with Alternative 3.

One Seven Buttes Return unit in particular is of key importance when considering cumulative effects. It is located between units 27 and 30 adjacent to a subdivision. This completes the treatment along this area of the Cres-Del Acres subdivision.

The Walker Range Fire Patrol Association has received funding to complete fuels treatments on private lands within the Crescent Lake Wildland Urban Interface area. Their efforts will augment and enhance the fuels treatments on Federal land to better protect the community from wildfire.

SPOTTED OWL HABITAT

Existing Condition

Within the boundaries of the planning area there are forested stands that provide suitable nesting, roosting, and foraging (NRF) habitat and younger aged stands that are suitable for dispersing northern spotted owls. Proposed vegetative treatments associated with this project may result in the short-term and/or long-term conversion of NRF habitat into stands less suitable for occupancy by northern spotted owls. Without silvicultural treatments, wildfire, insects, and/or disease could result in the long-term degradation or loss of spotted owl habitat. However, silvicultural treatments may also result in some short-term modification or degradation of habitat but result in creating forested stands that are more resistant to insects, disease, and fire over the long term. Habitat modification may also result in negatively impacting northern spotted owls that have not been identified because current Forest Service protocol surveys have not been completed for the entire planning area.

The project area does not contain any known spotted owl activity centers, nor do any home ranges of known pairs extend into the project area. The majority of the project area has completed surveys conducted to Forest Service protocol with the exception of areas Highway 58. Surveys will be conducted in 2004 along Highway 58 at the north end of the planning area. There is no designated northern spotted owl critical habitat within the project area.

The following evaluation criteria will be used to measure the effects of the planned activities:

- Acres of NRF habitat treated and percentage of the total NRF existing after harvest and road construction activities
- Acres of NRF habitat silviculturally treated within the Davis Late-Successional Reserve.
- Acres of dispersal habitat silviculturally treated in the project area.

Some of the vegetative conditions in the project area provide suitable habitat for the northern spotted owl, a federally threatened species. Depending on the stand structural characteristics, forested area may function as spotted owl nesting, roosting, and foraging habitat (NRF) or provide habitat capable of only allowing owl dispersal. Generally, NRF stands represent the highest quality habitat present providing potential nest sites, high quality prey habitat and also allow for owl dispersal.

There are approximately 1,125 acres of suitable NRF habitat in the project area, with most of that acreage located adjacent to Odell Lake, west of Royce Mountain, and on the east side of Crescent lake. There is no NRF habitat present within the 2,595 acres of private land in the project area. Nesting habitat fragmentation has occurred from past regeneration timber harvest, particularly east of Crescent Lake, but also on Royce Mountain. The most consolidated NRF habitat is present along the east side of Odell Lake extending from the northern tip of the project area northwest and outside of the project area to the summit of Willamette Pass. Of the 1,125 acres of NRF currently present, approximately 388 acres are planned to be commercially thinned as analyzed in the Baja 58 Environmental Assessment (EA) and another 26 acres of NRF would be commercially thinned as analyzed with the Seven Buttes Return EA.

Approximately 7,025 acres of forested stands in the project area provide suitable dispersal habitat for the spotted owl. This amount does not include stands that meet the definition of NRF habitat. To be defined as dispersal habitat, stands of lodgepole pine and mountain hemlock have to have an average stand diameter of 7 inches dbh or greater and at least 30 percent canopy cover; within mixed conifer and ponderosa pine forests, average stand diameter has to meet or exceed 11 inches dbh and greater than 40 percent canopy cover. Past regeneration timber harvests, shelterwood cuts, non-forested area, and stringer meadows create a fragmented dispersal habitat condition in several areas including the southern end of the project area and near Crescent Lake Junction.

Effects

The following three tables display the analysis data for impacts to spotted owl habitat. More discussion on the alternative impacts to spotted owls follows the tables.

Table 13. Acres of Nesting, Roosting, and Foraging Habitat (NRF) Treated within the Project Area by Alternative

Alternative	Acres of NRF Treated	Percent of Total Treated	Acres NRF Remaining
1	0	0%	1,125*
2	162	14%	963
3	237	21%	888
4	55	5%	1,054

*This amount includes the 414 acres of NRF habitat scheduled for commercial thinning under the Baja 58and Seven Buttes Return EAs.

Table 14. Acres of Nesting, Roosting, and Foraging Habitat (NRF) Treated within the Davis Late Successional Reserve by Alternative

Alternative	Acres of NRF Treated	Percent of Total Treated	Acres NRF Remaining
1	0	0%	8,559
2	52	<1%	8,507
3	52	<1%	8,507
4	5	<1%	8,554

Table 15. Acres of Dispersal Habitat Silviculturally Treated by Alternative

Existing Dispersal	Alt. 2 Treated	Alt. 3 Treated	Alt. 4 Treated
7,072	2,489 (35%)	2,489 (35%)	2,488 (35%)

Alternative 1

Direct and Indirect Effects

Implementation of this Alternative would result in no timber harvest or fuel treatments that would negatively impact any of the spotted owl pairs or NRF and/or dispersal habitat. Stands that are currently functioning as NRF habitat would continue to do so although ecological processes would continue to evolve that may result in some stands dying from insect damage and disease. The no action alternative would also result in no commercial and pre-commercial thinning of younger aged stands which would develop at a slower rate into conditions suitable for spotted owl dispersal or nesting habitat.

There are 2,595 acres of private lands in the project area consisting of several large subdivisions plus the community of Crescent Lake Junction. None of the private land acreage currently provides NRF habitat. Some of the stands however, currently provide dispersal habitat within stands of lodgepole pine. The long-term presence of dispersal habitat on private lands would be subject to the wishes of individual property owners and how they intend to manage their lands.

Cumulative Effects

As previously mentioned, approximately 414 acres of NRF habitat was analyzed in two recent EAs and those acres are expected to be commercial thinned in the near future. At the present time NEPA requirements are expected to be completed in 2004. The loss of this NRF habitat would result in further fragmentation of NRF habitat and incrementally reduce the chances of a spotted owl

pair establishing a territory in the project area. However, surveys conducted over the previous 10 years have not detected any spotted owl responses in this area.

Future analyses are likely to be scheduled within the project area to maintain a reduced fire risk on wildland urban interface areas and/or to treat other at risk stands as needed. At the present time no timetable has been established to conduct another environmental analysis. If or when that occurs, the assessment would disclose the current conditions of northern spotted owl habitat and follow existing direction in place at that time.

Implementation of Alternative 1 would result in no vegetative manipulation of any forested stands in the project area and would have "No Effect" on the northern spotted owl. There would also be "No Effect" on northern spotted owl critical habitat since it is not present within the project area.

Alternative 2

Direct and Indirect Effects

Implementation of this Alternative would result in the commercial timber harvest of 162 acres of NRF or 14 percent of the existing NRF habitat present in the project area. No harvest of NRF habitat would occur in any known spotted owl home range. The majority of the commercial thinning planned would occur on the east side of Crescent Lake with minor amounts on the west side of Royce mountain and near the southern tip of Odell Lake. The thinning proposed would primarily remove the understory lodgepole pine and white fir less than 21 inches diameter. To maintain a reduced fire risk, green tree removal would likely have to occur at regular intervals. The reduction in vertical and horizontal structure and lowered canopy cover would likely preclude these stands from functioning as NRF habitat for spotted owls into the foreseeable future. This would result in a direct long-term loss of NRF habitat. Thinned stands would still provide habitat for foraging and dispersing spotted owls that may move through the project area.

Fifty-two acres of NRF within the Davis Late Successional Reserve (LSR) would be commercially thinned in stands located near Odell Lake and along Highway 58. As described above, this would be a long-term negative impact as the stands would likely not be allowed to return into NRF conditions in the future. They would however continue to provide foraging and dispersal habitat for owls that may move through this end of the project area. Surveys would be conducted to protocol in 2004 to determine owl presence in this area. Mitigation measures are also in place for the retention of snags and down logs to provide spotted owl prey base habitat.

A total of 2,489 acres of dispersal habitat would be thinned and have fuel treatments in this Alternative. The greatest impact to dispersing spotted owls would likely occur within the lodgepole pine stands. The thinning in these stands may lower the canopy closure to the 25 – 30 percent range, which is the minimum range that currently defines dispersal habitat. Thinning would entail removing the understory lodgepole where it is growing as well as thinning the overstory component. These treatments would decrease the amount of vertical structure and offer less protection to dispersing owls. To partially mitigate this effect several lodgepole-dominated units including units 33, 41, and 49 in all alternatives would have at least 20 percent of the unit's acreage left unthinned. These blocks would provide dense cover areas for owls that may be dispersing in a north or south pattern through the project area. This should reduce the risk of dispersing spotted owl predation by great horned owls and goshawks. Feathering the edges of harvest units should also reduce the risk of additional green tree loss to windthrow. Project implementation would require the construction of up to 4 miles of temporary road and 2 miles of permanent road, some of which may be required in dispersal habitat within units 33, 41, and 49. After the completion of timber harvest and/or fuels reduction activities, temporary roads would be closed to vehicular travel. However, road construction would still result in long-term loss of forested habitat of approximately 2-3 acres per mile of road length.

Cumulative Effects

The combination of 162 acres of NRF treated under Alternative 2 plus the 414 acres of NRF from the Baja 58 and Seven Buttes Return EAs not yet sold, would result in the conversion of 576 acres of NRF or 51 percent of the nesting habitat currently present in the project area. While no regeneration harvest would occur, 576 acres would be converted to dispersal and foraging habitat. The remaining NRF habitat would be even more fragmented and may not be consolidated enough to support a nesting pair of spotted owls in the project area. Because the project's objectives are to improve forest health and reduce fire risk to wildland urban interface areas, these treated stands are not expected to return to NRF conditions in the short or long-term. Dispersal habitat would be maintained for owls that may be moving through the project area.

As described above, there are 2,595 acres of private lands in the project area. These acres do not provide NRF habitat, but some provide dispersal habitat. The long-term presence of dispersal habitat on private lands would be subject to the wishes of individual property owners and how they intend to manage their lands.

Future analyses may be scheduled within the project area to maintain a reduced fire risk on wildland urban interface areas and/or to treat other at risk stands as needed. At the present time, no timetable has been established to conduct another environmental analysis.

Alternative 2 Summary

The conversion of 162 acres of NRF habitat to dispersal habitat would be a short- and long-term negative impact to the northern spotted owl. Project implementation under Alternative 2 would **"May Effect, Likely to Adversely Affect"** the northern spotted owl.

Alternative 3

Direct and Indirect Effects

Implementation of this alternative would result in the commercial timber harvest of 237 acres of NRF or 21 percent of the NRF habitat currently present in the project area. No harvest of NRF habitat would occur in any known spotted owl home range. The direct and indirect effects of pre-commercial and commercial thinning on NRF habitat would be similar to that described in Alternative 2, with the exception that an additional 75 acres of commercial thinning of NRF habitat would occur on Royce Mountain (Unit 21).

A total of 52 acres of NRF habitat within the Davis LSR would be converted to foraging and dispersal habitat. Surveys would be conducted to protocol in 2004 to determine owl presence in the area near Highway 58 and to complete a two year six visit survey to protocol. Mitigation measures are also in place for retention of snags and down logs to provide spotted owl prey base habitat for northern spotted owls. The effects on spotted owl dispersal habitat would also be the same as described in alternative 2 since the same units and acreages are proposed. Similar mitigation measures are also in place as mentioned in Alternative 2. Project implementation would require the construction of up to 6 miles of temporary road, and up to 2 miles of permanent road, some of which may be required in dispersal habitat within units 33, 41, and 49. After the completion of timber harvest and/or fuels reduction activities, temporary roads would be closed to vehicular travel. However, road construction would still result in long-term loss of forested habitat of approximately 2-3 acres per mile of road length.

Cumulative Effects

The combination of 237 acres of NRF plus the 414 acres of NRF from the Baja 58 and Seven Buttes Return EAs would result in the conversion of 651 acres of NRF or 58 percent of the nesting habitat currently present in the project area. While no regeneration harvest would occur 651 acres would be converted to dispersal habitat. The remaining NRF habitat would be even more

fragmented and may not be consolidated enough to support a nesting pair of spotted owls in the project area. Because the project objectives are to improve forest health and reduce fire risk to wildland urban interface area, these treated stands are not expected to return to NRF conditions in the short or long-term. Dispersal and foraging habitat would be maintained for owls that may be dispersing through the project area.

There are 2,595 acres of private lands in the project area consisting of several large subdivisions plus the community of Crescent Lake. None of the private land acreage currently provides NRF habitat. Some of the stands, however, currently provide dispersal habitat within stands of lodgepole pine. The long-term presence of dispersal habitat on private lands would be subject to the wishes of individual property owners and how they intend to manage their lands.

Future analyses are likely to be scheduled within the Crescent Lake WUI project area to maintain a reduced fire risk on wildland urban interface areas and/or to treat other at risk stands as needed.

Alternative 3 Summary

The conversion of 237 acres of NRF habitat to dispersal habitat would be a short- and long-term negative impact to the northern spotted owl. Project implementation would **"May Affect, Likely to Adversely Affect"** the northern spotted owl.

Alternative 4

Direct and Indirect Effects

Implementation of this alternative would result in the commercial timber harvest of 55 acres of NRF habitat or 5 percent of the total NRF habitat currently present in the project area. No harvest of NRF habitat would occur in any known spotted owl home range. The majority of the commercial thinning planned would occur on the east side of Crescent Lake with minor amounts on the west side of Royce Mountain and near the southern tip of Odell Lake. The thinning proposed would primarily remove the understory trees that provide ladder type fuels in a fire situation. The reduction in vertical and horizontal structure would likely preclude these stands from functioning as NRF habitat for spotted owls into the foreseeable future. This would result in a direct long-term loss of NRF habitat because periodic thinnings would occur to maintain a reduced fire risk. Thinned stands would still function as dispersal and foraging habitat. The thinning proposed would involve primarily the removal of lodgepole pine and white fir with the vast majority of the trees removed being less than 21 inches dbh. Reduced harvest would occur on Royce Mountain and on Crescent Lake near the Makualla Boy Scout Camp. These blocks of NRF would continue to provide habitat for dispersing and foraging spotted owls that may move through the project area.

Five acres of Davis LSR NRF would be commercially thinned in the stands at Odell Lake Campground. As described above this would be a long-term negative impact, as the stands would likely not be allowed to return into NRF conditions in the future. They would however continue to provide foraging and dispersal habitat for owls that may move through this end of the project area. Surveys will be conducted to protocol in 2004 to determine owl presence along Highway 58 and complete a 6 visit 2 year protocol survey. Mitigation measures are also in place for the retention of snags and down logs to provide spotted owl prey base habitat for northern spotted owls.

A total of 2,488 acres of dispersal habitat would be thinned and have fuel treatments in this alternative with the same effects described in Alternative 2. As earlier described, project implementation would require the construction of up to 4 miles of temporary road and 2 miles of permanent road, some of which may be required in dispersal habitat within units 33, 41, and 49. After the completion of timber harvest and/or fuels reduction activities, temporary roads would be closed to vehicular travel. However, road construction would still result in long-term loss of forested habitat of approximately 2 to 3 acres per mile of road length.

Cumulative Effects

The combination of 55 acres of NRF plus the 414 acres of NRF from the Baja 58 and Seven Buttes Return EAs would result in the conversion of 469 acres of NRF or 42 percent of the nesting habitat currently present in the project area. While no regeneration harvest would occur, 469 acres would be converted to dispersal habitat. The remaining NRF habitat would be even more fragmented and may not be consolidated enough to support a nesting pair of spotted owls in the project area. Because the project objectives are to improve forest health and reduce fire risk to wildland urban interface area, these treated stands are not expected to return to NRF conditions in the short or long-term. Dispersal and foraging habitat would be maintained for owls that may be dispersing through the project area.

Alternative 4 Summary

The conversion of 55 acres of NRF habitat to dispersal and foraging habitat would be a short- and long-term negative impact to the northern spotted owl. Implementation of Alternative 4 would **"May Effect, Likely to Adversely Affect"** the northern spotted owl.

Late Successional Reserve Assessment

The Davis Late Successional Reserve (LSR) is divided into Management Strategy Areas (MSA). The LSR Assessment describes conditions and management objectives for each MSA. A modification to the original arrangement of MSAs was made to include 85 acres of the area along the Mid-State Electric utility corridor in an adjacent MSA that recognizes objectives to reduce fuel loadings in wildland-urban interface areas In December 2002, the Regional Ecosystem Office issued a memorandum to the Deschutes National Forest Supervisor stating that they concurred with the modifications to the Davis LSR Assessment.

The fuels and silvicultural treatments being proposed would still maintain habitat for the emphasis species of the Management Strategy Area, including the American marten, black-backed woodpecker, and cavity nesters. Alternative 2 would treat a total of 244 acres, Alternative 3 a total of 242 acres, and Alternative 4 would treat a total of 195 acres within the LSR portion of the project. The greatest difference between the alternatives is the reduction in northern spotted owl habitat affected in Alternative 4.

Discussion of Effects – Analysis Issues

WILDLIFE

Discussion of the effects to wildlife is divided into the following sections: PETS Species, Survey & Manage Species, Management Indicator Species, Big Game Hiding Cover and Forage, and Resident and Migratory Landbirds.

PETS Wildlife Species

Existing Condition

Several Proposed, Endangered, Threatened, or Sensitive (PETS) wildlife species are known to occupy habitats within the boundaries of the Crescent Lake WUI. Several other species are suspected to occur based on the presence of suitable habitat even though no documented wildlife sightings have been reported to date. The silvicultural and fire-related activities of the proposed action may result in direct, indirect, short-term, or long-term impacts to some or all of these species. Where possible, mitigation measures will be employed to reduce or eliminate negative effects to affected species. Formal consultation with the U.S. Fish and Wildlife Service was requested in October 2003, and a Biological Opinion (BO) received in February 2004. The USFWS concurred with the effects determination and the Crescent Lake WUI project would not jeopardize the continued existence of the spotted owl. Effects to the northern spotted owl are discussed under the Key Issues.

Effects

Table 16. Summary of Effects on Proposed, Endangered, Threatened, and Regional Forester Sensitive Wildlife Species Known or Suspected to Occur on the Deschutes NF.

Species	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Northern Spotted Owl (T)	NE	LAA	LAA	LAA
Northern Spotted Owl Critical Habitat	NE	NE	NE	NE
Northern Bald Eagle (T)	NE	NLAA	NLAA	NLAA
Canada Lynx (T)	NE	NE	NE	NE
Oregon Spotted Frog (FC)	NI	NI	NI	NI
Peregrine Falcon (S)	NI	NI	NI	NI
Horned Grebe (S)	NI	NI	NI	NI
Red-necked Grebe (S)	NI	NI	NI	NI
Bufflehead Duck (S)	NI	MIIH	MIIH	MIIH
Harlequin Duck (S)	NI	NI	NI	NI
Western Sage Grouse (S)	NI	NI	NI	NI
Yellow Rail (S)	NI	NI	NI	NI
Tricolored Blackbird (S)	NI	NI	NI	NI
Gray Flycatcher (S)	NI	MIIH	MIIH	MIIH
California Wolverine (S)	NI	MIIH	MIIH	MIIH
Pacific Fisher (S)	NI	MIIH	MIIH	MIIH
Pygmy Rabbit (S)	NI	NI	NI	NI

NE = No Effect; LAA = May Affect, Likely to Adversely Affect; NLAA = May Affect, Not Likely to Adversely Affect; NI = No Impact; MIIH = May Impact Individuals or Habitat, But will not Likely Contribute to a Trend Toward Federal Listing or Cause a Loss of Viability to the Population or Species.

Based on a pre-field review of existing records, habitat requirements, and existing habitat components in the project area, it was determined that there is no suitable habitat for the following species and they are not expected to occur: Western sage grouse, pygmy rabbits, yellow rails, tricolored blackbirds, and peregrine falcons. Project alternatives would have "No Impact" on these species.

Alternative 1 (No Action) Effects to all PETs Species

In the short-term there would likely be little noticeable change in habitat of proposed, endangered, threatened, or sensitive wildlife species. Those stands that have been recently treated either commercially or pre-commercially would continue to experience increased tree growth as compared to untreated stands. This would over time increase the amount of habitat available as nesting, roosting, or foraging habitat for northern spotted owls. However, over the long-term (several decades plus), untreated overstocked stands especially on south-facing slopes would continue to be at risk of losing their largest trees to insects and disease and potentially at catastrophic levels. The situation may also occur if we experience a drought that lasts for an extended period of time. If large tree mortality occurs above endemic levels and depending on the location it may result in a loss of spotted owl habitat in the project area and a reduction in large tree habitat needed by the bald eagle for nesting and roosting purposes. In the short-term and long term, no action would have "No Effect" on the northern bald eagle and Canada lynx. There would also be "No Impact" to the federal candidate species and those listed as sensitive by the Regional Forester because no change in habitat conditions would be expected in the short term.

Northern Bald Eagle

Approximately 840 acres of a designated bald eagle management area lies within the project area (see figure 3, page 10). A management plan for this BEMA, completed in 1998, provides guidance and recommendations on managing habitat for northern bald eagles.

Bald Eagles are year-round residents of Crescent Lake with surveys conducted several times from March through August to determine nest territory occupancy and nesting success. A survey is also conducted in early to mid-January to determine the number of wintering birds. Currently there is one pair territory in the project area and four known nests in the territory. There are no known communal roost sites, although they are assumed to be present.

Effects common to all Action Alternatives

Alternatives 2 and 3 propose 100 acres of treatments within 13 harvest units, of which 61-71 acres would involve only precommercial thinning of younger-aged stands primarily less than 20 years of age. A total of 29-39 acres of commercial thinning would also occur. Alternative 4 proposes treatments on 96 acres (12 units) that would include 67 acres of pre-commercial thinning only and 29 acres of commercial thinning.

All thinning is designed to reduce stand density allowing increased growth of residual trees. In older aged stands thinning would also relieve some of the stress on the overstory late successional and old growth ponderosa pine and Douglas-fir that are used for nest platforms and roost trees. Tree thinning would reduce fuel loadings and decrease the risk of wildfire entering adjacent private lands and destroying homes, resort buildings, and recreational facilities. All silvicultural and slash treatments would be consistent with the project design criteria as stated in the FY 2003-2006 Programmatic Biological Assessment prepared by the forest for proposed, threatened, and endangered species and critical habitat. In addition, all treatments are consistent with the objectives of the Site-Specific Bald Eagle Management Plans for the Crescent Lake Bald Eagle Nest Sites.

Stand density treatments can increase the risk for additional loss to windthrow. Those stands subject to southwest winds have the greatest potential for windthrow loss. To some extent this potential effect

can be mitigated by feathering edges and leaving greater tree retention in more exposed areas. Silvicultural prescriptions would take this into consideration.

To eliminate the disturbance risk to nesting and/or roosting bald eagles from harvest activities and burning operations, seasonal operating restrictions would be in effect for selected harvest units (See Mitigations section).

Cumulative Effects

In addition to the proposed harvest associated with this project, several recent environmental assessments (Seven Buttes Return, USDA 2001 and Baja 58, USDA 1998) planned several harvest units within the Crescent Lake East BEMA. At this time none of these units have been harvested. The silvicultural prescriptions of these areas are the same as described above, including a combination of pre and commercial thinning. All units are also consistent with the project design criteria of the Programmatic BA (2003-2006) and have received a concurrence of effects from the U.S. Fish and Wildlife Service. While future silvicultural entries may be planned within this BEMA, all planning efforts would take into consideration existing habitat conditions and current management direction for northern bald eagles.

Effects Summary

With the mitigation measures incorporated as designed, implementation of Alternative 2, 3, or 4 would "May Effect, But Not Likely to Adversely Affect" the northern bald eagle. Over the long-term, there may be beneficial effects on bald eagles and their habitat as treated stands become more resistant to disease and insects.

Canada Lynx – All Action Alternatives

The Canada lynx is a federally listed Threatened species. The Forest Wildlife Biologists for the Deschutes and Ochoco National Forests, and the Crooked River National Grassland have made a determination based on the best available science, that neither Canada lynx nor their habitat are currently present on these administrative units. There is only one verified Canada lynx record from the Deschutes National Forest collected near Lava Lake in 1916, and only 12 verified records in all of Oregon since 1897. Most of the verified lynx records in Oregon coincide with population peaks of lynx in Alaska and Canada. Self-maintaining lynx populations in Oregon have not existed historically, and lynx occurrence here is likely the result of dispersal from occupied areas with declining prey populations (Verts and Carraway 1998; McKelvey and Aubrey 2001). Surveys for lynx were conducted on the Deschutes National Forest in 1999, 2000, and 2001. There were no lynx detections confirmed from the survey effort.

The Lynx Biology Team reported that all investigations into lynx habitat in the southern part of its range shows an association between lynx and lodgepole pine cover types within the subalpine fir series. The best scientific information available suggests that subalpine fir plant associations capable of supporting a minimum density of snowshoe hares is a reasonable surrogate for describing lynx habitat conditions to support survival (primary vegetation to support survival and reproduction and constitute a Lynx Analysis Unit). In addition, the Lynx Conservation Assessment and Strategy (Reudiger et al. 2000) identified the need for at least 10 square miles of primary vegetation to support lynx survival and reproduction and constitute a Lynx Analysis Unit. On the Deschutes National Forest, four subalpine fir plant associations (subalpine fir-Engleman spruce, alpine parkland sedge, alpine parkland woodrush, and alpine parkland sagebrush) could be considered primary vegetation that could contribute to lynx habitat. In total, about 3,650 acres of subalpine fir plant associations occur across the entire Deschutes NF and most of those (3,500 acres) are "parklands" which do not support snowshoe hare. Therefore, there is not an adequate amount of primary vegetation to identify any lynx habitat or a Lynx Analysis Unit on the Deschutes National Forest.

Implementation of the no action or any action alternative with the vegetation and fuels management activities as proposed in the current project would have "No Effect" on the Canada lynx or their habitat.

Oregon Spotted Frog – All Action Alternatives

The Oregon spotted frog is currently listed as a candidate species by the US Fish and Wildlife Service. There are currently 6 known populations of Oregon spotted frogs on the Crescent District, outside the project area. Surveys in 2002 within streams and wetlands of the project area confirmed the presence of Cascade frogs in Crescent Creek, but no Oregon spotted frogs were detected.

Based on surveys conducted in 2002, the proposed activities for this project would not impact any known populations of Oregon spotted frogs. In addition, mitigation measures have been incorporated into project design that would restrict tree removal and burning activities within a designated distance from the stream edge to allow for future wood recruitment into the stream and to provide wildlife habitat. With these measures in place there should be no impact to Oregon spotted frogs if present. These measures are consistent with the project design criteria in the FY2003-2006 Programmatic BA. Project implementation of any action alternative will result in "No Impact" to the Oregon spotted frog.

Horned Grebe

There are no records of horned grebes on the Crescent District. Nesting has been confirmed on the Malheur Refuge in Oregon. The most suitable nesting habitat on the Crescent District may be found along the shorelines of Wickiup Reservoir, Davis Lake, south end of Crescent Lake, Big Marsh, and the high elevation lakes within the OCRA because of the shallow water and presence of reedy vegetation along the shorelines. No surveys have been conducted to confirm the presence of this species.

No timber harvest or road activities are planned immediately adjacent to the shoreline of Crescent Lake that would negatively impact potential nesting habitat or disrupt this species during the nesting season. Because no habitat is being disturbed by project activities, there would be "No Impact" to the horned grebe from any action alternative.

Rednecked Grebe

Similar to the horned grebe, the most suitable nesting habitat on the district may be found along the shorelines of Wickiup Reservoir, Davis Lake, southern end of Crescent Lake, Big Marsh, and the high elevation lakes in the OCRA.

There are no harvest or road activities planned immediately adjacent to Crescent Lake that would negatively impact potential nesting habitat or disrupt this species during the nesting season. Because no habitat is being disturbed by project activities, there would be "No Impact" to the rednecked grebe.

Bufflehead Duck

On the Crescent Ranger District, buffleheads are commonly seen on the large lakes and reservoirs year-round or until freeze-up occurs when they fly off to find open water and food resources. They nest in tree cavities or artificial nest structures within about 200 yards of lakes, ponds, and rivers.

Removal of snag habitat near bodies of water has the potential to negatively impact this species. Project implementation may result in the felling of a limited number of existing snags for safety reasons within units adjacent to Crescent Lake. However, post-harvest surveys of snag habitat on recently harvested timber sales in this area in most cases, exceed those required to maintain species populations. To mitigate the expected loss in snag habitat, the retention of snags particularly near bodies of water is required. At least four snags per acre in mixed conifer and ponderosa pine PAGs and 2.6 snags per acre in lodgepole pine PAGs will be retained. Implementation of this measure would assure habitat is present for all cavity nesting species including the bufflehead duck.

Because snag densities in units adjacent to Crescent Lake may decline in the short-term, there may be a loss of potential bufflehead duck nesting habitat. Implementation of any action alternative may result in a determination "May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend

Toward Federal Listing or Cause a Loss of Viability to the Population or Species of the bufflehead duck."

Harlequin Duck

The breeding range of the harlequin duck includes the Cascade Mountains of Washington and Oregon. Within the Cascades, the harlequin is an uncommon summer resident. The nearest breeding activity to the project area was documented on the Deschutes River. No suitable potential breeding habitat is within the project area. No potential nesting habitat would be impact by the proposed action, therefore any action alternative would have "No Impact" to the Harlequin duck.

California Wolverine

The most suitable denning habitat for wolverines would be located within the Mt. Thielsen and Diamond Peak Wilderness areas and the adjacent OCRA, outside of the project area. District records include three unconfirmed sightings of wolverine near the summit of Willamette Pass, two sightings near Maklaks Mountain, and two sightings north of Crescent Lake along Crescent Creek, which would tend to indicate that the animals may be present on the Forest, although no natal dens have been confirmed at this time. The sightings were not in denning habitat although the animals may have been foraging or dispersing when observed. Forest carnivore surveys in 1995, 1996, and 1998 did not detect any wolverines.

Project implementation would not result in any loss or disturbance of denning habitat although individual animals dispersing or foraging may be temporarily displaced in the lower elevation coniferous stands where project activities would occur. Because home ranges are very large, the impact on individual animals would be very temporary and localized and the animals would tend to move away from human activities. Based on these expected impacts, project implementation of any action alternative "May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Toward Federal Listing or Cause a Loss of Viability to the Population or Species."

Gray Flycatcher

In northern Washington the habitat used by gray flycatchers is fairly specific: dry open ponderosa pine stands with extensive bitterbrush and bunchgrasses (Woodruff 2002). In Central Oregon, they are commonly found in juniper, sage, bunchgrass habitats. The common factor seems to be scattered vertical structure of evergreen trees over an extensive shrub and grass understory (savannah). Marshall etal. (2003) stated they are an uncommon to locally fairly common breeder east of the Cascade summit, including the Columbia plateau southward throughout the Great Basin. He also states records in southeast Deschutes County and northwest Klamath County, Oregon show the species will nest in sparse lodgepole pine stands over bitterbrush and sagebrush. The nest is constructed of plant fibers and shredded bark and placed in shrubs or small trees within 6 feet of the ground. Gray flycatchers feed exclusively on insects in flight, from the ground, or from plants. Breeding bird surveys are showing an annual 5 percent increase in Oregon since 1966 (Marshall et al 2003).

Although no surveys have been completed and there are no documented records for this species on the Crescent Ranger District suitable habitat is likely present particularly in the lodgepole pine and mixed lodgepole pine/ponderosa pine stands on the southern and eastern portions of the district. Gray flycatchers have been documented to occur during the breeding season based on the southernmost proposed firewood cutting area (Boucher, pers comm.. 2003). Gray flycatchers on the Chemult District were found in ponderosa pine/lodgepole pine tree plantations that had been pre-commercially thinned and were generally more open than the surrounding forested areas.

All action alternatives propose understory tree thinning which would provide more open forested stands described as suitable habitat. However, fuels treatments including underburning and mowing of bitterbrush would reduce their suitability as nest stands except within retention areas. Because potential nesting habitat is being impacted, project implementation of any action alternative "May Impact Individuals or Habitat, But Will Not Likely Cause a Trend toward Federal Listing or Cause a loss of Viability to the Population of Species."

Pacific Fisher

Fishers inhabit a variety of densely forested habitats including coniferous, deciduous and mixed forests in both upland and lowlands. Limited carnivore snow tracking, baited camera sets, and track plates have been used to try and detect marten, fisher, and wolverine presence on the district with surveys occurring in 1994, 1995, 1996, and 1998. There were no detections of fishers documented from these surveys. One radio collared juvenile fisher was detected in the Big Marsh Area in 1999 after dispersing from the Rogue River National Forest District wildlife sighting records also list one unconfirmed fisher sighting near Odell Lake campground within the project area.

The thinning treatments proposed in all action alternatives would retain sufficient canopy cover to maintain fisher habitat. Over the long-term, reducing stand densities would increase the growth rate of residual trees and increase the amount and distribution of mid- and late-successional stands more favorable to fishers.

Removal of some dead and down lodgepole pine along Highway 58 south of Odell Lake and near Crescent Lake Junction may indirectly affect the fisher by reducing habitat for prey species such as rabbits, mice, and voles, although mitigation measures would include the retention of slash piles and a minimum of 300 linear feet of down logs per acre to provide prey base habitat. Fishers that may be in the project area may also be displaced into adjacent habitats as a result of timber harvest activities and the associated disturbance during the period operations may occur. Project implementation of any action alternative "May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Toward Federal Listing or Cause a Loss of Viability to the Population or Species" to the Pacific fisher.

Survey & Manage Wildlife Species

Existing Condition

The Forest Service and Bureau of Land Management issued a Record of Decision in January 2001 for the Final Supplemental Environmental Impact Statement for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. This document modified the number of species that are listed as survey and manage and clarified where and how surveys would be conducted.

The Crater Lake Tightcoil snail (*Pristiloma articum crateris*) is the only mollusk species on the survey and manage list that has been documented to occur on the Crescent Ranger District. Mollusk surveys were conducted to protocol within proposed harvest areas of the project where there is suitable habitat. The following units or portions of units had riparian habitats that were surveyed: 2, 6, 7, 8, 12, 14, 18, 20, 25, 26, 27, 28, 30, 33, 38, 41, 42, 45, 49, 67, 68, 80, 84, 88, 91, 82, and 100.

Effects

Mollusks

Surveys were conducted in 2002, with two visits to each survey area. There were no Crater Lake Tightcoil snail sites confirmed during the survey effort. Implementation of any of the action alternatives would have no impact on the Crater Lake Tightcoil snail.

White-headed woodpecker, Black-backed woodpecker, Pygmy Nuthatch, and Flammulated Owl

While this group of species was not identified as survey and manage, the Northwest Forest Plan recognized this group of cavity nesters would not be sufficiently aided by applying mitigation measures

for riparian habitat protection or other elements of the plan. To ensure that species distribution and numbers of all four species do not decline, adequate numbers of large snags and green tree replacements for future snags within appropriate forest types of these species will be left to maintain 100 percent of potential population level of each species. This would require the retention or creation of 4.0 snags per acre in mixed conifer and ponderosa pine forests and 2.6 snags per acre in lodgepole pine forests (USDA 1994(a)).

White-headed woodpeckers, pygmy nuthatches, and flammulated owls can be found in the Ponderosa pine PAG. There are no records of these species present in the project area although they are assumed to be present. Black-backed woodpeckers are most common in the lodgepole pine PAG and are assumed to be present in the project area.

Effects

Effects Common to All Action Alternatives

While no regeneration timber harvest is proposed that would completely remove habitat for these species, commercial thinning operations may require the removal of a limited number of existing snags to meet OSHA safety regulations. This may result in some species displacement if operations occur during the nesting season. Because tree mortality is always occurring at least at endemic levels, new snags are continually being created at the local and landscape level. In addition, post-sale monitoring is conducted to determine the snag density within treated areas. If snag densities are below desired levels and KV funding is available, new snags are created. If KV funding is not available, other sources of funding would be required. Lodgepole pine snag creation is rarely done because they are very susceptible to beetle attacks and natural mortality is very common. Snag creation is conducted within Ponderosa pine and mixed conifer stands where snag densities are deficient to maintain 100 percent potential population level for dependent species.

The thinning treatments proposed over time would increase average stand diameters of green trees and snags that would benefit the flammulated owl, white-headed and pygmy nuthatches that are associated with large diameter ponderosa pine habitats.

Information on the use of the DecAid Advisory Tool and relationship to this group of species is provided in Appendix C.

Fringed myotis bat, Silver-haired myotis bat, Long-eared myotis bat, Long-legged myotis bat, and Pallid bat

This group of bat species is not listed as survey and manage, however, standards and guidelines have been prepared to ensure their protection. Sites commonly used by bats include caves, mines, snags, and decadent trees, wooden bridges, and old buildings. Provisions have been provided to retain large diameter snags and green tree patches in the matrix. Caves, abandoned mines, wooden bridges and buildings are important roost and hibernation sites for which additional feasible measures are required to ensure their value as habitat. Protection of these structures would be contingent on safety concerns and legal requirements.

Effects

Effects Common to Each Action Alternative

There are no known caves or mines within the project area, although one wooden bridge is present over Odell Creek at the entrance to Odell Lake Resort. Limited bat surveys were conducted in the project area under the wooden bridge of Odell Creek plus the concrete and wood bridges on Odell Creek and Crescent Creek in 1996 and 1997. One long-eared myotis was detected day roosting under the Odell Creek concrete and wooden bridge during the 1996 survey. There is no construction/re-construction planned for any of these bridges associated with the current project.

If caves or abandoned mines are discovered in the future, surveys may be conducted to determine bat presence or if surveys are not conducted, then assume the species are present. Timber harvest

would be prohibited within 250 feet of the site and management direction would be developed as needed to protect the site (Survey and Manage Record of Decision, 2001)

Great Gray Owl

Great gray owls generally inhabit open lodgepole pine or mixed lodgepole/ponderosa pine forests in mid to late structural stages. Foraging habitat is typically defined as natural meadows greater than 10 acres in size, riparian areas, clear-cut and selectively logged areas where they forage on small mammals such as shrews and chipmunks. Within the range of the northern spotted owl, suitable nesting habitat may be found in mature forested stands with greater than 60 percent canopy cover although some nests have been recorded in stands with only 40 percent canopy cover.

Current foraging habitat capability within the project area was mapped, and includes 8,085 acres of foraging and 5,303 acres of nesting habitat. Great gray owl surveys have confirmed the presence of one nesting territory in the Refrigerator Creek drainage near the southern project area boundary. The table below displays the existing habitat and amount treated by each alternative.

Table 17. Acres and Percentage of the Great Gray Owl Habitat in the Project Area Treated by Alternative

Existing Acres of Foraging Habitat	Alternative 1	Alternative 2	Alternative 3	Alternative 4
8,085	0	1,756 (22%)	1,756 (22%)	1,726 (21%)
Existing Acres of Nesting Habitat				
5,303	0	1,635 (31%)	1,635 (31%)	1,622 (31%)

Alternative 1 – Implementation of this alternative would result in no vegetative treatments to reduce the risk of tree loss to insects, disease, or fire from overstocked stands. Forested stands that are currently providing nesting capability and/or foraging habitat would continue to do so at least in the short term. However, if an extended drought condition were to develop, increased stand mortality may result from competition for water resources, weakening tree resistance and making them more susceptible to insect attacks and loss to fire. Depending on the severity of tree loss to insects or fire, there may be a reduction in the amount and distribution of nesting habitat in the project area.

All Action Alternatives – As displayed in the previous table, implementation of any action alternative would have nearly the same number of acres of habitat treated and Alternatives 2 and 3 are the same. In Alternative 4, slightly fewer acres are proposed for thinning. The silvicultural treatments proposed include pre-commercial and commercial thinning, several hundred acres of salvage of dead and down lodgepole pine, and approximately 110 acres of underburning.

Direct effects would include a reduction in canopy cover as a result of commercial thinning and from precommercial thinning where prescribed. This reduction in tree density may result in an increased ability of great gray owls to maneuver while foraging in treated stands. Thinning is also planned in two meadow complexes to reduce lodgepole pine encroachment which would allow greater great gray owl foraging capability in these areas at the southern end of the project area. The salvage proposed north of Crescent Lake Junction would reduce the amount of small mammal habitat for primary prey species of the owl. Mitigation measures would require at least 300 linear feet of down wood left in each harvest unit and slash piles would also be left untreated for small mammal habitat. The thinning of foraging habitat should have no impact on the great gray owl.

The understory thinning proposed in potential nesting habitat would reduce tree density and canopy cover and would likely preclude great gray owl nesting in these stands in the short- and long-term. Within older lodgepole pine stands, canopy cover may be reduced to approximately 25 – 35 percent post-harvest. Nesting capability would still be maintained in the 15-20% retention areas of each harvest unit with nesting habitat and within untreated habitat in the project area. Suitable habitat is present to support several pairs of great gray owls in the project area.

The thinning proposed may indirectly result in additional tree loss to windthrow particularly in lodgepole pine dominated stands. Feathering stand edges may help to mitigate this effect and would be applied during sale layout and marking where evidence of windthrow is occurring. No harvest would occur within 0.25 mile of the known nest territory and if new nests are discovered in the future, the same measure would apply

Cumulative Effects to Survey and Manage Wildlife Species

Because surveys have been completed for mollusks and there are no known sites within the project area, no cumulative effects would occur to the Crater Lake Tightcoil snail. For the group of cavity-dependent species, mitigation measures have been incorporated into the analysis that would require the retention of existing snags to maintain 100 percent potential population levels for these species. If snag densities are insufficient and if funding is available new snags would be created to meet current standards and guidelines. For the bat species, if caves or mines are discovered in the future, surveys would be conducted or we would assume the species are present and manage accordingly. Great gray owl nesting habitat would be well distributed regardless of the alternative selected.

Management Indicator Species Habitat

Existing Condition

During the preparation of the LRMP, a group of wildlife species was identified as management indicator species. These species were selected because their welfare could be used as an indicator of other species dependent upon similar habitat conditions. Indicator species can be used to assess the impacts of management actions on a wide range of other wildlife with similar habitat requirements. In addition to northern spotted owl (discussed as key issue), the management indicator species listed in the following Table 18 will be considered. All of these species are assumed to occur in the project area and most have been documented to occur. The exceptions are the wolverine, for which several unconfirmed sightings have been reported, the Townsend's bat, for which there are no known caves to provide suitable roosting habitat, and the peregrine falcon, for which there is no nesting habitat. Peregrine falcon and wolverine are discussed under the PETS species section. Impacts to mule deer and elk are discussed in the next section. Potential impacts to the remaining species are discussed below. Timber harvest and road construction have the potential to remove and/or degrade suitable habitat for species or result in short-term disturbance when thinning operations are underway. More detailed information on the habitat requirements of and project impacts to all of the MIS species can be found in the wildlife specialist's report, located in the project file.

Table 18. Management Indicator Species (MIS) Selected for the Deschutes National Forest

Species	Status
Black-backed 3-Toed Woodpecker	MIS
American Marten	MIS
Northern Goshawk	MIS
Osprey	MIS
Northern Bald Eagle	MIS, FSS, FT
Northern Spotted Owl	MIS, FSS. FT

Species	Status
Mule Deer	MIS
Elk	MIS
Woodpecker Guild	MIS
Great Blue Heron	MIS
Great Gray Owl	MIS, NFPPB
Peregrine Falcon	MIS, FSS
Wolverine	MIS, FSS
Townsend's Big-eared Bat	MIS
Waterfowl	MIS
Golden Eagle	MIS
Redtail Hawk	MIS
Cooper's Hawk	MIS
Sharpshin Hawk	MIS

MIS = Management Indicator Species; FSS = Region 6 Regional Forester Sensitive, FT = Federally Listed Threatened; NFPPB = Northwest forest Plan Protection Buffer

Effects

Alternative 1 (All MIS)

Implementation of this alternative would result in no immediate change in vegetative conditions within the project area. Natural succession would continue to occur with the greatest tree growth occurring in those forested stands that have been pre-commercially thinned.

In the short-term, there would likely be little noticeable change in habitat or populations for management indicator species. Those stands that have been recently treated either commercially or pre-commercially would continue to experience increased tree growth as compared to untreated stands. This would over time increase the amount of habitat available as nesting, roosting, foraging or denning habitat.

However, over the long-term (several decades and more) untreated, overstocked stands especially on south-facing slopes would continue to be at risk of losing their largest trees to insects and disease and potentially at catastrophic levels. The situation may also occur if we experience a drought that lasts for an extended period of time. If tree mortality occurs above endemic levels, it would provide additional foraging and nesting habitat for the woodpecker guild and those species dependent on snags. Conversely, extensive stand loss could have a detrimental effect on species such as the northern spotted owl, accipiter hawks, marten, and the great gray owl which need forested stands for nesting, foraging, denning, or dispersal. Depending on the severity of stand loss, multiple pairs or individuals could be adversely affected resulting in a reduction in species distribution across the project area. Green tree loss would have less of an impact on golden eagles, ospreys, cavity nesting waterfowl, and great blue herons which can utilize dead and dying trees as nest platforms.

Black-Backed 3-Toed Woodpecker

Habitat is generally well-distributed across the planning area, with about 9,300 acres of forested stands meeting the definition of suitable habitat. Information from DecAid indicates black-backs can be supported at the 50 percent tolerance level with snag diameters at about 12 inches in the east-side mixed conifer habitat. DecAid does not state the number of snags per acre to maintain this tolerance level. More discussion of the DecAid synthesis tool and its application to this project is in Appendix C. The table below displays the current condition of black-backed 3-toed woodpecker habitat within the planning and the amount treated by each alternative.

Table 19. Acres and Percentage of the Black-Backed 3-Toed Woodpecker Habitat in the Project Area Treated by Alternative

Existing Acres of Habitat	Alternative 1	Alternative 2	Alternative 3	Alternative 4
9,300	0	2,575 (28%)	2,654 (29%)	2,464 (27%)

Alternative 2 – Potential nesting and foraging habitat may be removed during commercial thinning harvest because OSHA safety regulations require the felling of hazardous trees (snags) that have the potential to injure forest workers. The salvage of dead and down logs would also degrade stands that function as nesting and foraging habitat. Because black blacks are known to forage on down wood (Goggans et al 1989) DecAid was reviewed for down wood recommendations. DecAid shows blackblacks can be accommodated at the 30 percent tolerance level with 4.5 percent down wood ground cover. This level of down wood is unlikely to be achieved over the long-term except within retention areas to maintain a reduced fire risk. Habitat degradation would be a short-term direct effect reducing the amount and distribution of suitable nesting and foraging habitat within those units selected for timber harvest. Logging operations may also result in some displacement of birds into adjoining stands providing suitable habitat during the nesting season. To mitigate the expected decrease in snag densities during harvest operations, snags will be left or created to maintain cavity excavator species including the black-backed woodpecker at the 100 percent population level. Also, the 15-20% retention areas will provide high snag level densities where they occur naturally.

Within lodgepole stands, windthrow may result in the indirect loss of additional habitat. Lodgepole pine is susceptible to high wind events because of shallow root systems. This effect lessens several years after thinning as the remaining trees develop deeper roots better able to withstand high winds.

Alternative 3 – Implementation of this alternative would have direct and indirect effects very similar to Alternative 2, even though an additional 79 acres would have green tree removal. The greatest difference between Alternative 2 and 3 is that approximately 700 more acres of commercial thinning would occur in Alternative 3. However, the same mitigation measures would apply to retain or create snags at levels to maintain the species at 100 percent population level.

Alternative 4 – Implementation of this alternative would result in direct and indirect effects similar to Alternative 2, although reduced acreage would be affected in mid- and late-seral mixed conifer stands on Royce Mountain and on the east side of Crescent Lake. These untreated areas along with the 15-20% retention areas planned for each unit would continue to provide high snag densities where they occur naturally. Similar to Alternatives 2 and 3, Alternative 4 would have the same mitigation measures applied to retain or create snags at the level to maintain cavity excavators at the 100 percent potential population level. With the mitigation measures in place, there should be no long-term negative impact to 3-toed woodpeckers and their habitat.

American Marten

Marten habitat is well distributed and there are documented records of marten in the project area. Data available in DecAid indicates that marten are associated with high snag densities. To maintain marten at the 50 percent tolerance level would require snags > 20” at 5 per acre which is very limited in the project area. The 50 percent tolerance level would also be maintained with 16 snags per acre >= 10” diameter. Again, snag densities this high are very limited. The table on the next page shows the amount of habitat and the amount affected by each alternative.

Table 20. Acres and Percentage of the American marten habitat in the Project Area Treated by Alternative

Existing Acres of Habitat	Alternative 1	Alternative 2	Alternative 3	Alternative 4
8,968	0	2,447 (27%)	2,522 (28%)	2,337 (26%)

Alternative 2 – Implementation of this alternative would allow a combination of commercial and pre-commercial thinning on a total of 2,447 acres (27%) of the acreage currently identified as marten habitat. Post-sale treatments such as piling and burning of slash would also occur in these areas.

While marten habitat would be retained in all treated units, a reduction in habitat quality is expected to occur. To reduce fire risk to adjacent private lands, a reduction in stand density is required and many treated areas will become single-story stands. This reduction in tree density would reduce overhead cover that provides some protection against avian predation on marten. However, it is expected overhead canopy cover would still be greater than the 30 percent that defines suitable marten habitat. In addition, where salvage of dead and down wood is planned (units 2, 6, and 12), a reduction of marten prey base habitat would occur with an expected corresponding decrease in prey densities, primarily small mammals. To mitigate this effect, a minimum of 300 linear feet of down wood and one slash pile per acre would be left to provide small mammal habitat and marten rest sites.

An indirect effect of treatments is that the residual trees are expected to have increased growth with increased canopies and develop into larger diameter trees in the future capable of providing den sites or platforms for resting animals. If the risk to stand loss from insects, disease, and wildfires is not reduced, there is the potential for catastrophic loss of marten habitat in this project area.

Treated stands would likely never develop into high tolerance level (>50%) habitat for marten since accumulations of down wood and very high snag densities would present too much of an increased fire risk which is not the desired future condition in an urban interface.

More discussion on marten and DecAid is provided in Appendix C.

Alternative 3 – Similar to Alternative 2, the proposed activities would occur on 28% of the existing marten habitat in the project area. The effects would be similar to those described in Alternative 2 with the exception of slightly more acreage commercially thinned. This would occur on the south side of Odell Lake and the southeast side of Crescent Lake near the Boy Scout Camp permitted area. Commercially thinned units would still provide marten habitat although quality would be reduced because of reduced canopy cover. Over the long term, increased tree diameters are expected to develop and provide marten resting and denning sites.

Alternative 4 – Implementation of this alternative would allow timber harvest within 2,337 acres of 26 percent of the suitable marten habitat in the project area. The major difference with this alternative is that reduced harvest would occur along the eastern shore of Crescent Lake as compared to Alternative 3. These untreated stands would continue to provide high quality marten habitat because of the large diameter trees that provide resting and denning sites and the large amount of down woody material that provides habitat for prey species. Similar to the other action alternatives, it is expected harvest units would retain their capability to support marten. This would be accomplished by the silvicultural prescriptions that maintain overhead canopy cover above 30 percent and mitigation measures for the retention of snags and coarse woody debris to provide marten denning and resting sites. While prey base densities may decrease in the short-term, treated stands would be less susceptible to catastrophic loss from insects and disease.

Northern Goshawk

About 8,538 acres of suitable goshawk habitat exists within the project area. Most of this is suitable for both nesting and foraging. The suitable habitat is generally well-distributed, with some fragmentation from regeneration harvests east of Crescent Lake and on Royce Mountain. Goshawk

sightings have been recorded and surveys were conducted during the 2002 field season confirming one nesting pair southeast of Crescent Lake.

Table 21. Acres and Percentage of the Northern Goshawk Habitat in the Project Area Treated by Alternative

Existing Acres of Habitat	Alternative 1	Alternative 2	Alternative 3	Alternative 4
8,538	0	2,062 (24%)	2,132 (25%)	1,951 (23%)

Alternative 2 – Implementation of this alternative would treat 24% acres of the suitable goshawk habitat. Because no regeneration harvest is proposed there would be no reduction in the amount of suitable habitat present, although habitat degradation is expected. This would occur as mid- and late-successional stands are commercially thinned below the 60 percent canopy cover level modeled as the nesting habitat minimum. The stands would continue to provide suitable foraging habitat however. It is likely silvicultural treatments would be conducted to maintain the reduced fire-risk level. This would likely prevent stands from becoming nesting habitat over the long-term. However, suitable nesting habitat would be maintained in unthinned clumps and other no harvest areas. This would be similar to the naturally patchy mosaic of habitat conditions typically found in a goshawk territory. While the loss of nesting habitat capability would occur, there would concurrently be an increase in stand acreage allowing easier goshawk maneuvering pursuing prey species within thinned stands.

No treatments would occur within the 25-acre known nest site and in the event new nests are discovered, protection would be afforded consistent with existing direction. Seasonal operating restrictions may be required if potentially disturbing activities are proposed during the northern goshawk nesting season (see mitigation section).

Alternative 3 – Implementation of this alternative would result in timber harvest on 25% of the suitable goshawk habitat in the project area. Similar to Alternative 2, there would be no loss in suitable habitat, but habitat degradation would occur principally from the commercial thinning within mid- and late-successional stands that would become single story and be converted to foraging habitat. The major difference between alternatives 2 and 3 is that 3 has one additional harvest unit on Royce Mountain and that 730 more acres would have commercial harvest. Nesting habitat would be maintained in the 15-20% retention blocks of each harvest unit and within untreated areas of the project area. Treated stands would continue to provide foraging habitat. Mitigation measures would also be in effect for the retention of snags and coarse woody debris to provide habitat prey base species (see mitigation section).

Alternative 4 – Implementation of this alternative would result in timber harvest within 23% of the suitable goshawk habitat within the project area. The short and long-term effects would be similar to that described for Alternative 2 with the exception that harvest acreage would be reduced near the southeast side of Crescent Lake (Units 43, 66, 71, and 76 are dropped) as well as Unit 21 on Royce Mountain. Similar to alternatives 2 and 3, there is no regeneration harvest proposed with no loss of suitable habitat.

Osprey

Ospreys are very common the Crescent Ranger District. Five known osprey nests are located in the project area, and four of these were active in 2002. Four nests are located near Odell Lake and one on the east shore of Crescent Lake.

All Action Alternatives - Forest Plan direction will be incorporated into each planned activity and will result in no impact to the osprey population within the project area. Protection includes maintaining vegetative character within 300 feet radius of nest sites, and maintaining at least four dominant overstory trees per acre for nest and perch trees with ponderosa pine favored where available. Nest sites are also protected from disturbing activities within 0.25 mile of the nest by restricting site disturbing operations during the period of April 1 to August 31. See the mitigation section for a list of units where seasonal restrictions have been placed.

Woodpecker Guild

The woodpecker guild represents wildlife dependent on snags for nesting or denning. On the Deschutes National Forest 10 species of woodpeckers excavate cavities used by 33 other species of hole-nesters incapable of excavating their own nest site. The woodpecker species guild selected as MIS includes the black-backed, white-headed, hairy Lewis, pileated, and three-toed woodpeckers plus the northern flicker and Williamson sapsucker.

In 2002 an advisory tool was developed (DecAid, Marcot et al. 2002) that synthesized published research data on wildlife and forest inventory data and professional knowledge of fungi, insects, and pathogens. DecAid presents information on wildlife use of snag diameters, snag density, down wood diameter, and down wood percent cover. Details on the use of DecAid for the Crescent Lake fuels reduction project are included in Appendix C. The information presented here is summarized from that appendix.

Currently in the project area there are snags in densities and diameters to support white-headed woodpeckers above the 80 percent tolerance level. However, for pileateds, the habitat could support less than 50 percent of the population since large diameter snags are in insufficient numbers. There is little information available on other species except on snag diameters by tolerance level that could be supported.

All Action Alternatives – Because the Crescent Lake Fuels Reduction Project does not specifically target snags for removal, negative effects to the cavity excavator guild is expected to be minimal in the short-term. Implementation of any action alternative may result in a very limited number of existing snags felled where log deck landings are proposed, where temporary roads may be constructed, or where an obvious safety concern exists to forest workers. The overall project design is to reduce the density of understory green trees on National Forest System Lands near and adjacent to a wildland urban interface. Mitigation measures have been incorporated into the project design to minimize snag loss. Snag inventories are typically conducted after the completion of commercial harvest to determine snag densities and if additional snags are needed. If snag densities are insufficient to meet desired levels, snag creation may occur if monies are available for additional larger diameter snags.

Over the long-term, the understory thinning proposed may result in fewer smaller diameter snags available for cavity excavator species. In overstocked stands, many of the understory white fir and lodgepole pine would naturally be subjected to stress induced mortality from a lack of sunlight or water resources. Insect infestations are also a common cause of tree mortality. By reducing the stand density the affected stands should be healthier and at less risk to uncontrolled wildfire. Endemic levels of tree mortality would still occur and provide snags for cavity excavator species that would be larger than are currently present. With the mitigation measures in place to retain snags where they occur and to create additional snags as needed and as funding is available, habitat would be maintained for this guild of indicator species at the 30 to 50 percent tolerance level or higher.

Great Blue Heron

Great blue herons are colonial nesters and it is very common for multiple pairs to nest in one tree or snag. They forage along streams, rivers, lakes, and ponds on fish and amphibians and are also known to forage in meadow habitats. There are no known heron rookeries in the project area.

All Action Alternatives – If heron rookeries are discovered in the future, habitat protection direction is provided in the Forest Plan. The vegetative character in rookeries will be protected, and seasonal restrictions in disturbing human activities would be in effect from March 1 to August 31 for a 0.25 mile radius around the nest tree.

Waterfowl

Waterfowl species including mergansers, scaup, buffleheads, and goldeneyes are commonly observed on Odell and Crescent Lakes. Some occasional use by puddle ducks such as mallards and teal are also seen in the shallow water habitats on Crescent Lake.

All Action Alternatives – Implementation of any alternative is not expected to change water levels that would adversely affect nesting success of waterfowl. There are also no proposed actions that would impact potential ground nesting habitat for any species. In all alternatives, however, some

stand treatment is likely to occur within the riparian zones. Wood ducks, goldeneyes and bufflehead ducks all utilize cavities in snags as nest structures. Timber harvest within riparian zones may reduce the number of standing snags currently present. To mitigate this potential loss, the Forest Plan requires the retention of snags. In mixed conifer and ponderosa pine PAGs at least 4 snags per acre are required for retention and 2.4 snags per acre would be maintained in the lodgepole pine PAG. This measure in addition to nest structures currently provided by and maintained by the Oregon Department of Fish and Wildlife would help mitigate the loss of snag habitat. Over the long-term, no adverse impact is expected to occur because of on-site mitigation (snag retention) and natural recruitment of new snags.

Golden Eagle

There are no confirmed golden eagle sightings within the project area, although 11 reports exist for the District, one of which was a nesting pair.

All Action Alternatives – Implementation of any action alternative is not expected to have any impacts on golden eagles. Mitigation measures as described in the Forest Plan would protect any future discovery of golden eagle nest sites.

Redtail Hawk

Redtail hawks are widely-distributed across North America and will winter from southern Canada south into the United States and Central America. They can occupy a variety of habitats due to their ability to utilize a variety of prey species. The District has 23 records of redtail hawk nests, although there are no known nests within the project area. Suitable nesting habitat within the project area would occur in the mixed conifer, ponderosa pine, and lodgepole pine PAGs with medium to large size trees. Trees of this size would likely have the limb structure to support a nest.

All Action Alternatives – Implementation of any action alternative is not expected to negatively impact redtail hawks. Occupied nests if discovered are protected with seasonal restrictions (see mitigation measures) and nest trees are prohibited from harvest. In addition, most timber harvest proposed with this project focuses on understory tree removal which would retain the largest trees in all treated stands, which would continue to provide suitable sites for nesting.

Cooper's Hawk

There are numerous records of Cooper's hawk sightings on the Crescent District, although none within the project area boundary. Only three nests have ever been located on the District, and none within the project area. Approximately 3,085 acres of the project area contain forested stands that may provide suitable nesting habitat for Cooper's hawks (ponderosa nd mixed conifer ranging from 50 to 80 years in age). These acres are located on Royce Mountain, along the eastern and northern shores of Crescent Lake, and near the southern end of Odell Lake.

All Action Alternatives – Implementation of any action alternative would result in vegetation and fuels operations within 538 (Alt. 4) to 642 (Alt. 2) to 722 acres (Alt. 3) of potentially suitable Cooper's hawk nesting habitat. However, no nesting habitat would be removed because no regeneration harvest is proposed. The timber harvesting proposed is primarily understory thinning to reduce stand densities and lessen the risk of catastrophic stand loss to insects, disease and/or to wildfire. Some salvage of dead and down timber is also proposed that would have a negligible effect on Cooper's hawk habitat. Because Cooper's hawks will nest in stands with larger trees that are more widely spaced than Sharpshin hawks, the thinning proposed should maintain nesting habitat on the higher elevation lands where ponderosa pine and mixed conifer stands are present. There is no timber harvest proposed within any known Cooper's hawk nest territory. In addition, mitigation measures are in place to restrict ground disturbing activities during the breeding season if nests are discovered. Implementation of any alternative should have no impact on Cooper's hawks.

Sharpshin Hawk

Sharpshin hawks have been observed on the Crescent District, but no sightings or nests within the project area. About 3,000 acres of potentially suitable nesting habitat within mixed conifer and ponderosa pine stands are located within the project area, on Royce Mountain, east of Crescent Lake,

along the south end of Odell Lake, and within some spruce and lodgepole dominated stands in wet meadow complexes.

All Action Alternatives – Implementation of any action alternative would result in the timber harvest of 538 to 722 acres of potentially suitable nesting habitat for sharp shin hawks. There is no regeneration harvest proposed, however, the pre- and commercial thinning proposed would result in wider tree spacing that would likely preclude sharpshins from using treated stands for nesting. Because project objectives are to reduce the risk of wildfire on National Forest System lands in the wildland urban interface, it is expected that thinning would be conducted at regular intervals to maintain a reduced risk level. For the short- and long-term, sharpshin nesting habitat would be retained in no harvest blocks and within the 15-20% retention areas of each unit. These measures would still permit sharpshins to establish nesting territories with the planning area, and treated areas could be utilized as foraging habitat. Mitigation measures are in place to protect occupied sharpshin nest stands if discovered during project operations, by restricting disturbing activities during the nesting season.

Cumulative Effects to MIS Species

Several recent environmental assessments (Seven Buttes, Baja 58, and Seven Buttes Return) had project area boundaries that partially overlapped the current project area. Several timber sales from those EAs have harvest units within the Crescent Lake project boundary. The Royal sale on Royce Mountain has been completed, and the Critter project has been sold.

Implementation of any action alternative in addition to silvicultural and/or fuels treatments that are or will be occurring in the near future are anticipated to have effects on some management indicator species. There is no regeneration timber harvest proposed that would completely eliminate habitat for any MIS species in the short or long term. However, thinning treatments are expected to have short-term impacts to several species including American marten and 3-toed woodpecker because of reduced canopy cover and a reduction in the amount of down wood and snag densities. For the northern goshawk and sharpshin hawk short and long-term impacts to nesting habitat are projected because of reduced canopy cover and the expectation that these treated stands would not attain nesting capability again. However, nesting territories for each species would be maintained through retention blocks and suitable habitat that is not within the proposed action. Mitigation measures have been designed to reduce negative effects where possible through timing restrictions and retention of adequate levels of snags and down wood to meet Forest Plan standards and guidelines. No-harvest retention areas averaging 15-20% of each unit would also continue to provide suitable nesting and denning habitat throughout the project area.

Big Game Cover and Forage

Existing Condition

The LRMP specifies at least 30 percent of each subwatershed should be maintained in hiding cover for the benefit of mule and elk populations. Generally this condition is reached when forested stands reach an average height of 6 to 8 feet. The proposed action would result in stand reduction activities that would at least temporarily reduce hiding cover within affected stands. For the purposes of this analysis the planning area would be treated as a single analysis area since the proposed action includes an approximate 12,000-acre area similar in size to many of the subwatersheds on the district.

The project area currently contains approximately 10,035 acres of National Forest System lands, of which approximately 300 acres are non-vegetated lands. The remaining 9,735 acres contain vegetation capable of providing forage or hiding cover for summering deer and elk populations, both of which are present. Table 22 displays the current cover/forage conditions within the project area. Essentially, the project area contains a well-distributed mix of forage openings including riparian-dominated vegetation in the Odell Creek, Crescent Creek, and Refrigerator Creek drainages. These areas also include wet meadow complexes heavily used by both deer and elk. Forage openings are also present in younger aged plantations, and recently thinned stands where tree density is not sufficient to provide hiding cover

for deer or elk. Hiding cover is well-distributed as well across the project area and includes stands of lodgepole and mixed conifer that have not been thinned, or previously thinned stands that have re-grown into a suitable hiding cover condition

Effects

Table 22. Big Game Cover and Forage Acres by Alternative

Alternative	Cover Acres	Forage Acres	Cover/Forage Ratio (%)
1	8,451*	1,284	87/13
2	5,000	4,735	51/49
3	4,861	4,874	50/50
4	5,113	4,622	53/47

*****This figure includes approximately 1,373 acres of current cover habitat that has been analyzed in the Seven Buttes Return and Baja 58 EAs and are proposed for commercial and pre-commercial thinning in 2004 – 2007.

Alternative 1

Implementation of the No Action Alternative would result in no immediate change in the current cover/forage condition within the project area. After a decade, there would be a gradual increase in the amount and distribution of hiding cover present within the project area. This is a result of increased tree growth in young forested plantations and also within older stands with a second canopy layer that would provide increased capability to hide deer and elk from view.

Alternatives 2, 3, and 4

Each action alternative proposes a mix of silvicultural treatments including commercial and precommercial thinning, post and pole tree removal, and salvage of dead and down lodgepole pine. The proposed acreages that would be treated by alternative are nearly similar ranging from 3,451 acres in Alternative 2, to 3,590 acres in Alternative 3, and 3,338 acres in Alternative 4. All green tree treatments are expected to reduce the ability of those forested stands to provide effective cover for deer and elk for the short and long term. Because the overall project objective is to reduce fire risk, repeated treatments are likely to occur on an as-needed basis. A minimum of 15 percent of each units' acreage would be left to provide hiding cover for deer and elk although no unharvested clumps would be placed adjacent to private lands in the project area. With this measure in place and considering that hiding cover is still maintained above the minimum level recommended in the Forest Plan, there should be no measurable change to deer and elk populations in the project area.

Cumulative Effects

The silvicultural and fuel activities planned in this assessment as well as those proposed in the Seven Buttes Return and Baja 58 EAs which overlap the project area would not cumulatively exceed the minimum levels required for big game hiding cover in this area. Approximately 1,373 acres of these two projects have proposed silvicultural thinnings within the current project boundary and implementation is expected to occur from 2004 to 2007. Combined with the current project, cover percentages would range from 37 to 39 percent, still exceeding the minimums recommended in the Forest Plan. Because much of the total harvest from both projects is adjacent to each other, 20 percent retention was proposed for several units including 33, 41, and 49. These units separate a Seven Buttes Return EA unit to the west and private land to the east. While no retention areas would be placed next to private land, the increased amount of unharvested stands of lodgepole pine are expected to provide more hiding area for deer and elk where management activities are concentrated.

Another mitigation measure restricts harvest operations for selected units during the calving/fawning season (see page 27).

The current open road density within the project area is 3.33 miles per square mile on National Forest System Lands, which exceeds the recommended maximum of 2.5 miles per square mile. All temporary roads constructed to provide access to harvest units would be closed after completion of management actions.

Key Elk Management Area

Existing Condition

The Deschutes Forest Plan identified key elk areas forest-wide with an overall objective to maintain habitat conditions to support at least 1,500 summering elk and 240 wintering elk. The 1,616 acre Maklaks Key Elk Area is located south of Maklaks Mountain and east of Highway 58. Approximately 284 acres of this KEA overlap the Crescent Lake WUI project area. The Forest Plan specified minimum levels of hiding (30%) and thermal cover (20%) to maintain. Proposed timber harvest has the potential to modify the amount and distribution of hiding and thermal cover stands within the KEA. Currently, there are 1,286 acres or 80% of the KEA in thermal cover and 90 acres or 6% of the KEA providing hiding cover only. Thermal cover stands are providing both hiding and thermal cover; consequently, the current condition exceeds forest plan minimums.

In addition to the requirement for hiding and thermal cover, the Forest Plan recommends that open road densities within KEAs not exceed 1.5 miles per square mile. The open road density within the Maklaks KEA is currently 0.78 miles per square mile, within the recommended range.

Effects

Alternative 1

Effects on elk habitat can be summarized by the changes in the amount of hiding and thermal cover within the affected key elk areas and the change in open road density. Implementation of Alternative 1 would result in no immediate change in vegetative condition. At the present time thermal cover stands are well distributed across the entire KEA including stands of lodgepole pine in frost prone areas and mixed conifer on higher elevation areas. In addition, there are pockets of mixed conifer and spruce along some of the riparian stringer meadows. There would be no salvage of down and dead lodgepole and/or commercial thinning to lessen the risk of catastrophic fire in this area. Over the next several decades there would not be an appreciable change in elk habitat in this area unless a catastrophic event such as a major fire or large scale beetle epidemic occurred that would remove much of the cover currently present. If this occurred, hiding cover capability would be lost for 10-15 years until regenerating trees reached a height of 6-8 feet capable of hiding elk once again. Thermal cover capability would require another two to three decades for trees to reach a minimum of 40 feet in height. There would be no change in road density within the KEA by implementing Alternative 1.

Alternatives 2, 3, 4

All three action alternatives propose silvicultural treatments on the same two units (7 and 90) that total 97 acres located in the southern end of the KEA. The only difference between the three alternatives is that Alternative 4 does not propose commercial thinning and salvage in Unit 7 as part of the vegetative treatment, but would occur in Alternatives 2 and 3. Pre-commercial thinning and the piling and burning of slash would occur in each unit with each alternative. The effects on elk habitat would be similar. It is expected the precommercial thinning proposed would reduce the ability of stands to provide hiding and thermal cover in the short-term. Depending on treatment return intervals, these stands may never provide hiding and/or thermal cover over the long-term. The conversion of 97 acres of thermal cover to a non-cover condition would reduce the thermal cover of the KEA to 1,189 acres or 72 percent of the KEA, which is still well above the Forest Plan minimums described earlier. This

conversion would not be expected to have a measurable effect on summering elk populations in this area.

To minimize disturbance to animals that may be calving within the riparian zones of the KEA, a seasonal restriction on all harvest activities would be in effect from May 1 through June 30 for those units near riparian areas (see mitigation section for list of units).

Cumulative Effects

Very limited timber harvesting and road construction has occurred within the Maklaks KEA partly because of the many riparian areas and stringer meadows. The Seven Buttes EA (USDA 1996) located one harvest unit within the Maklaks KEA at the very north end. Because of the limited harvest, hiding and thermal cover requirements still exceed the Forest Plan recommended minimums. Implementation of this project with the mitigation measures described is not expected to have a measurable effect on summering elk populations. Future environmental analysis of project that may occur in the KEA would take into consideration the existing habitat condition at that time and the direction provided by the Deschutes Forest Plan.

Resident and Migratory Landbirds

Existing Condition

A Memorandum of Understanding (MOU) is being developed with the U.S. Fish and Wildlife Service to conserve migratory birds including taking steps to restore and enhance habitat and incorporate migratory bird conservation into agency planning processes. Silvicultural treatments including commercial and pre-commercial thinning in early, mid- and late-successional stands of ponderosa pine, mixed conifer, and lodgepole pine, in addition to underburning activities have the potential to negatively and positively impact habitat for resident and migratory birds.

To avoid or minimize the negative impact of actions on migratory birds, the Forest Service has prepared a Landbird Strategic Plan (January 2000) to maintain, restore, and protect habitats necessary to sustain healthy migratory and resident bird populations to achieve biological objectives. At the local level, agencies and organizations within the Oregon-Washington Chapter of Partners in Flight developed a publication for conserving landbirds in this region. A Conservation Strategy for Landbirds of the East Slope of the Cascade Mountains in Oregon and Washington was published in June 2000 (Altman 2000).

The project area contains two of the three habitat types found in this region (ponderosa pine and mixed conifer) forests. Ponderosa pine habitat is limited to less than 300 acres and confined to a small area east of Crescent Lake, although ponderosa pine trees can be found in most PAGs. For more details on habitat types and features, refer to the Wildlife Specialist's Report. The Conservation Strategy lists biological objectives for each habitat type.

In 2002 the US Fish and Wildlife Service released a report entitled "Birds of Conservation Concern (BCC). The species list within the document identifies bird species of concern at national, regional, and landscape scales. The Deschutes National Forest encompasses 2 Bird Conservation Regions (BCR) including the Northern Pacific Forest and the Great Basin. Many of the species listed in both regions are already identified as forest management indicator species, on the Regional Forester's sensitive list, or in the Conservation Strategy publication (Altman 2000).

Effects

Implementation of the Crescent Lake WUI project would have no impact on the shorebirds listed on both BCRs because we are not proposing vegetative treatment along the shore of Crescent Lake where some of these species may occur. Effects to the woodpecker guild and raptors in each BCR have been previously discussed in this document. Other species on the list such as the sage sparrow do not occur in the project area because sagebrush habitats are not present.

Alternative 1

This alternative would result in no treatments to reduce stand competition, advance stand succession, or maintain the health and vigor of the existing plant communities in the project area. Overstocked stands would continue to be at risk to catastrophic wildfires, disease, and insect infestations that have the capability to negatively impact thousands of acres across the project area. Even though ponderosa pine habitats are limited throughout this project area, there would be no opportunity to improve conditions for those species associated with this habitat type.

Within mixed conifer stands, no change would likely occur to avian species composition and distribution. Natural succession would continue to evolve increasing canopy cover, average stand diameters, and allowing coniferous understories to further develop. However, the increasing basal area and stand density would continue to create stress on the dominant large diameter trees in the stands and may result in an increased rate of mortality above endemic levels. This is also the habitat component that takes several hundred years to attain. In the absence of forest management to reduce tree competition forested stands will continue to be at risk to large scale stand replacing events such as wildfires, insect outbreaks, and disease. If these events were to occur, there would be long-term negative impacts to species such as the brown creeper, Flammulated owl, hermit thrush, and the olive-sided flycatcher.

Within the lodgepole pine PAG dense stands of late-successional and old growth would be at increased risk to mountain pine beetle attacks, especially over the long-term. Within younger stands of lodgepole pine, there would be no opportunity to thin overstocked plantations and advance the development of these areas toward mid- and late-successional conditions beneficial to associated species.

Alternatives 2 and 3

Implementation of either Alternative 2 or 3 would result in essentially the same effects to resident and migratory landbirds. Because ponderosa pine habitat is very limited in the project area, there is little opportunity to create open park-like conditions favorable to species such as the white-headed woodpeckers, chipping sparrows, and white-breasted nuthatches. The minor amount of ponderosa pine thinning that would occur is within early- and mid-seral stands to reduce stand competition and increase residual tree growth.

Within mixed conifer stands, both alternatives propose a combination of commercial and pre-commercial thinning or pre-commercial thinning to reduce stand density and reduce fire risk. Understory thinning of trees less than 21 inches in diameter would be the primary method utilized to reduce this risk. In addition, understory burning could occur within units 2 and 6 to further reduce the risk of uncontrolled wildfires. Mowing of shrubs such as bitterbrush and manzanita would also be prescribed in selected units including 15, 17, 19 and 29. Overall, these actions would essentially convert multiple canopy stands into single story stands although there would be no conversion of late-seral or mid-seral stands into early-seral habitats. These treatments would have the greatest negative effect on multiple canopied associated species such as the varied thrush, chestnut back chickadee, winter wren, and Townsend's warbler. Conversely, the thinning, mowing, and burning treatments would benefit mixed conifer species that prefer more open habitats including the Flammulated owls, red-breasted nuthatches, brown creepers, and red-napped sapsuckers. While stand density reduction is expected to be negative to several species, no harvest retention areas and untreated stands within the project area would continue to provide habitat for this group of species. They also inhabit coniferous forests west of the Cascade Mountains in Oregon and Washington where environmental conditions are more favorable to maintaining multiple canopied forests.

Impacts to the black-backed 3-toed woodpeckers, the focal species for lodgepole pine, were described in the Management Indicator Species section.

Indirect effects include the temporary displacement of some species during logging operations and the possibility of additional tree loss to windthrow particularly on southwest aspects. However, this can be minimized by marking fewer trees (feathering) near openings. To partially mitigate the habitat losses, a minimum 15 percent of each harvest unit would not be impacted by burning or thinning to maintain dense canopied areas with a shrub component if available, to provide nesting and foraging

habitat for resident and migratory species. Mitigation measures are also in place to protect snags and large-diameter down wood during underburning operations.

The forest management activities proposed in this alternative are consistent with the biological objectives previously stated including no net loss of ponderosa pine or mixed conifer forest, retention of large diameter snags and trees, enhancing the size and connectivity of high quality habitat, and improving the quality of degraded habitats.

Alternative 4

Implementation of this alternative would result in the same treatment objectives, direct, and indirect effects as described for Alternatives 2 and 3 although slightly fewer acres would be included (refer to the Wildlife Specialist report for more details). Reduced harvest of multiple canopied mixed conifer stands would occur on Royce Mountain and along the east side of Crescent Lake. This measure would continue to provide some larger consolidated blocks of mixed conifer multiple canopied stands suitable for occupancy by varied thrush, chestnut backed chickadee, winter wrens, and Townsend's warblers while still reducing fire risk in other areas adjacent to recreational sites, private property owners, and the Crescent Lake Resort.

As described in Alternative 2, mitigation measures would be in effect to maintain at least 15 percent of each harvest unit kept in an untreated condition to provide nesting and foraging habitat for resident and migratory birds. During burning operations, snags and large diameter down wood would be protected wherever possible to maintain these habitat components.

The forest management activities proposed in this alternative are consistent with the biological objectives previously stated including no net loss of ponderosa pine or mixed conifer forest, retention of large diameter snags and trees, enhancing the size and connectivity of high quality habitat, and improving the quality of degraded habitats.

Cumulative Effects

Several previous environmental assessments have proposed silvicultural treatments within the boundaries of the Crescent Lake WUI. While no regeneration timber harvest was proposed, a combination of single and multi-story treatments have been prescribed to improve forest health conditions. Those harvest units from the Seven Buttes EA, Baja 58 EA, and Seven Buttes Return EA cumulative to the current proposal would improve forest health and reduce wildfire risk on 3,000 to 4,000 acres in this project area. The vast majority of the treatment would occur in lodgepole pine and mixed conifer habitat with short- and long-term impacts to migratory and resident landbirds associated with these habitats.

Because of very limited ponderosa pine habitat, most of the long-term positive impacts would benefit single-story mixed conifer associated species. While multi-canopied mixed conifer habitat would decline, assuming periodic silvicultural entries to reduce fire risk, these species would still have habitat available in the project area and the Crescent Ranger District as well as the west side Cascade Mountains. The prescriptions applied to this project in concert with previous EAs would help to attain the biological objectives listed in the conservation plan for the East-Slope Cascades.

Old Growth Management Areas

Existing Condition and Management Direction

Portions of 2 Old Growth Management Areas (OGMA) are present within the boundaries of the Crescent Lake WUI project. One is located at the north end of the PA that parallels Highway 58 and east of the Mid-State electrical grid and is also bisected by Odell Creek. This OGMA is dominated by mid- and late-successional lodgepole pine and some Engleman spruce in the wet areas. The function of this OGMA is to provide habitat for the black-back 3-toed woodpecker. The second OGMA is located near

the junction of Highway 58 and Road 61, also known as the Crescent cut-off road. The portion of the OGMA within the PA is primarily wet lodgepole pine but also transitions into a dry ponderosa pine PAG immediately east of the PA boundary. Mid- and late-successional ponderosa pine is present with an understory of lodgepole pine. The OGMA was designated to provide habitat for the northern goshawk. There are no records of goshawk nesting activity in this OGMA at this time.

The DLRMP (pages 4-149-151) provides direction for the management of OGMA. The plan says under Timber Harvest (M15-4) there will be no scheduled timber harvest or wood removal in these areas during this planning period, however, vegetative manipulation including removal may occur to perpetuate or enhance old growth characteristics. Under Prescribed Fire (M15-19), the plan states prescribed fire is not appropriate in lodgepole pine stands. In ponderosa pine and mixed conifer stands, prescribed fire may be used to achieve desired old growth characteristics. It may also be used to reduce unacceptable fuel loadings that potentially could result in high intensity wildfire.

Effects

Alternative 1

The selection of this alternative would have no immediate change in the character of either OGMA. Each site would continue to provide habitat for the designated wildlife species in the short-term. However, over the long-term there is an increasing risk of partial or complete stand loss to stress inducted mortality from overcrowding and/or beetle outbreaks. Stand loss from wildfire is also a concern. The selection of this alternative would not likely maintain the desired old growth characteristics for the long-term in each OGMA.

Alternative 2

The selection of this alternative would result in 49 acres (units #2 and #7) of small and large tree thinning plus salvage within the Odell Creek OGMA. Because black-back woodpeckers have large individual home ranges that can range from 178 acres to 810 acres (Goggans et al. 1989) the 49 acres proposed for stand density reduction and salvage of dead and down lodgepole pine would comprise only a portion of an entire home range. Black-back woodpecker habitat would still be maintained because snags for foraging substrate and mature and older live lodgepole pine with heartrot infection would be left to provide potential nest trees. Even with the thinning and salvage proposed, large diameter trees, snags and down wood would be left to maintain old growth characteristics. A potential indirect effect that may occur after the thinning proposed is for additional tree fall during high wind events. Lodgepole pine is shallow-rooted and susceptible to windthrow. Where possible, feathering along stand edges may reduce the potential for this effect.

Approximately 8 acres (Unit #42) of the Road 61 OGMA would have small tree thinning scheduled which would remove some of the live trees under 8 inches diameter. There would be no salvage of dead and down and no thinning of trees greater than 8 inches diameter. There are no records of goshawks nesting in this OGMA and the proposal would likely have little impact on goshawks because of the small amount of acreage involved. The thinning of 8 acres near the junction of Highway 58 and Road 61 would reduce the potential for wildfire occurrence and reduce the risk of large tree loss from beetle kill by reducing stand density. The vast majority of the OGMA acreage would not experience any silvicultural treatment and remain in its current condition.

Alternative 3

The selection of this alternative would result in the same acreage and units proposed for treatments within each OGMA as described in alternative 2. The effects for the Odell Creek OGMA would be the same as alternative 2.

Within the Road 61 OGMA both small and large tree thinning and salvage would occur. The complement of silvicultural treatments proposed would likely further reduce the potential for wildfire

moving through the treated stands into the remaining OGMA acreage. It would also provide greater assurance over the long-term of retaining late- and old growth lodgepole pine by reducing tree competition. Because there are no known goshawk nesting territories in the OGMA and surrounding area, there would likely be little impact to this species. Reduced stand density would allow foraging goshawks if present more room to maneuver while pursuing prey. The OGMA would still maintain a mix of tree diameters including old growth sized ponderosa pine and coarse woody debris desired to maintain the structural conditions prescribed for OGMAs.

Alternative 4

The selection of this alternative would result in the same acreage and units proposed for treatments within each OGMA as described in alternative 2. The main difference within the Odell Creek OGMA is that only small tree thinning would occur in the 42 acres of unit #7 instead of large and small tree thinning plus salvage as prescribed for alternative 2 and 3. This would retain all the lodgepole pine trees greater than 8 inches in diameter, leaving a higher post-harvest canopy cover, and likely maintain more potential nest trees infected with heartrot. Because no salvage would occur, down wood would also be left for foraging habitat. While Goggans et al. (1989) found that only 4 percent of black-back foraging observations were on down logs, this structural component is still important for many other species.

Because only small tree thinning is proposed for the Road 61 OGMA, the effects would be similar to that described in alternative 2.

Cumulative Effects To Old Growth Management Areas

There are no cumulative effects expected to either OGMA because no vegetation management has been implemented other than projected to occur with this decision. There are also no projects scheduled to occur in the foreseeable future that would impact either OGMA.

RIPARIAN AND AQUATIC COMPONENTS

Discussion of the effects to water-related issues is divided into the following sections: Water quality, Aquatic Species, Aquatic Conservation Strategy Objectives, Cumulative Watershed Impacts, and Wild & Scenic River Corridors.

Water Quality

Existing Condition

Currently, Crescent Creek, Odell Creek, and Odell Lake have been listed by the Oregon State Department of Environmental Quality (ODEQ) as having water quality below the desired standards set by the State. Crescent Creek is listed because of high summer temperatures, Odell Creek is listed because of high summer temperatures and a high pH value, and Odell Lake is listed because of a high pH value (*see table 23*). More detailed information on the water quality data is available in the Hydrology Specialist Report in the project file. Section 303d of the Clean Water Act requires the State to maintain a list of these water bodies. Any activities proposed near these water features must improve the conditions or at least ensure that conditions are not degraded. Big Marsh Creek is also within the analysis area and exceeds ODEQ standards but has not been listed or proposed for listing at this time. Treatments are proposed near all of these water bodies for fuels reduction purposes.

A water quality restoration plan has been prepared for Crescent Creek, which identifies the point source of the water temperature regime of Crescent Creek and restoration opportunities (USFS 2001). The source of the high summer temperatures appears to be discharge from Crescent Lake reservoir during irrigation season. One of the objectives for helping to attain ODEQ water quality standards that is within the scope of the current fuels reduction project, is improving growth rates of upland vegetation to attain the site potential growth heights of trees along the streams to maintain shade.

Table 23. Waterbodies Exceeding State Standards for Water Quality (303(d) list)

Watershed HUC	Watershed Name	Water Body Name	Parameter Listed for:
170703010102	Odell Lake	Odell Lake	Summer pH levels outside the range of 6.5 to 8.5
170703020508	Middle Crescent	Crescent Creek	Exceed Summer salmonid rearing temperature of 17.8^{o}C
170703010103	Odell Creek	Odell Creek	Exceed Summer salmonid rearing temperature of 17.8^{o}C and pH exceeding 8.5

Generally, roads in this planning area are in good condition and do not contribute to water quality degradation. However, a problem is occurring on FS road 60000100 (see Roads Analysis Report). The 60000100 road lies between the Union Pacific Railroad to the west and Crescent Creek on the east. FS Road 100 was built in close proximity to Crescent Creek and there are three major crossings. Most of the length of this road is located in the drainage area of Crescent Creek and can be characterized as moist to inundated. There are three stream crossings in the northern segment that contribute sediments to the stream channel during runoff events.

The following table gives current road miles in each subwatershed, road density (miles per square mile), and percent of the subwatershed that is roaded.

Table 24. Total Miles, Road Density and Percent of Road in Watershed

6th Field Watershed	Roads Miles	Road Density mi/mi^{2}	Percent of Watershed Roaded
Big Marsh	69	3.2	.85
Crescent Lake	88.9	2.37	.73
Middle Crescent	141.9	5.11	1.51
Odell Creek	138	5.87	1.37
Odell Lake	26.6	1.09	.37
Refrigerator Creek	16.72	1.87	.5
Cold Creek	13.25	1.4	.4

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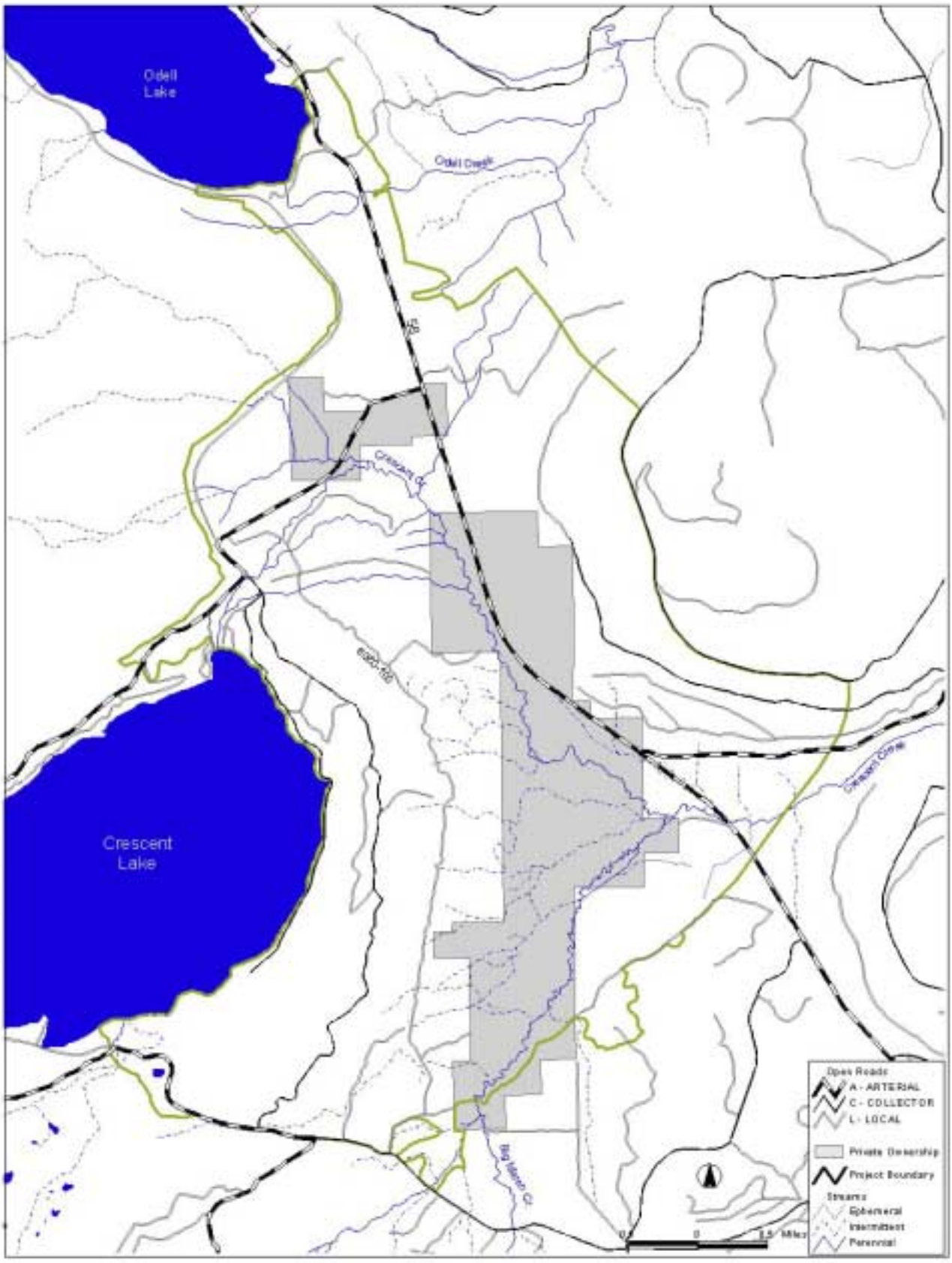
Figure 9. Streams in the Project Area



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Effects

Alternative 1

Since improved road surfacing and improved road drainage will not occur, roads will still pose a threat to water quality in the area where Forest Road 6020100 crosses Crescent Creek and its tributaries. Culverts that are undersized and determined to not meet criteria to withstand a 100-year flood event will remain in place.

Water temperature: Implementing the No Action alternative would have no direct effect on water temperature of streams. Possible indirect effects of the no action alternative include the response of water bodies to natural and maybe intense disturbances, including large-scale wildfire. Risk of catastrophic fire and loss of shade, riparian diversity, and increased fine sediment inputs could occur along riparian areas where fuel loads are high; potentially increasing the risk of raising the water temperature in Odell, Crescent, Big Marsh, Cold, and Refrigerator Creeks.

Water temperatures have been known to increase as a result of fires because of created openings along the stream corridor (Gresswell 1999). Helvey (1972) and Amaranthus et al. (1989) found water temperatures increased by as much as 10^{o}C in headwater streams. However, wider streams rely less on regulating water temperature with canopy closure than on volume, discharge, and water temperatures of tributaries. So although the same acreage of riparian area is burned, water temperature will increase much greater in a small channel than a large channel.

The current condition of Crescent Creek not meeting water temperature standards is addressed in the Crescent Creek Water Quality Restoration Plan (USFS 2001). High water temperatures were found to be caused from the volume of water released from Crescent Lake. Channel dimensions and riparian conditions were less involved in the high water temperatures reported. Channel widths and shade measurements showed that shade contributes some, but is less of a factor in controlling water temperatures than tributary inputs mixing with lake water as it flows from Crescent Lake. Indirect increases caused by wildfire would be slight on Crescent Creek compared to the influence of the summer water volume from Crescent Lake, and the width of the stream.

PH: The No Action alternative would have no direct effect on the pH level of Odell Lake. Indirect effects of the No Action Alternative could result from natural disturbances. The potential impact of fires within the basin may affect the pH of Odell Lake. Fires release many elements to be later leached into water bodies. Elements such as sodium, potassium, nitrogen, calcium, and silica, phosphorus and magnesium have been studied (See Gresswell (1999) for review of these studies). Peaks in nitrogen and phosphorus, two elements critical for plant growth were found to peak for a few weeks after a fire but mostly contributed to precipitation. For large lakes nutrient input from the effects of fire are less measurable, mostly due to the quick uptake by phytoplankton. Also, the water volume and renewal times seem to minimize these influxes (Bayley et al. 1992). The potential for fire effects to contribute to nutrient input of area lakes and streams within the project area will increase. Phytoplankton blooms are identified as a leading cause of the increased pH levels in Odell Lake (USFS 1999). The levels that would contribute to the overall lake productivity and increased pH above the current levels would be low.

Spencer et al. (in press) has shown that fires can increase nitrogen and phosphorus level 5 to 60 fold. Depending on the time of year and location of the fire significant nutrient inputs may contribute to phytoplankton blooms and potentially increasing the pH of Odell Lake even higher than its current measurements. Therefore, fire along Odell Lake may have short-term impacts to Odell Lake water quality and fall outside the TMDL currently being established for pH on Odell Lake. In the long-term however these spikes in nutrients and pH will not negatively effect the aquatic biota within Odell Lake and further contribute to the decline of the water quality of Odell Lake.

Cumulatively, Odell Lake is currently receiving nutrients that have been generating phytoplankton blooms over the past couple of years producing pH levels that exceed State standards. A TMDL is currently being developed by ODEQ to abate this problem. The production of excess nutrients due to fire contributing to increased pH will be possible. However, these pulses should be short term

occurring during the fire phase and while smoke is in the air during a precipitation event. Runoff pulses contributing nutrients to Odell Lake will be few and nutrients to lake volume will not significantly affect the pH of Odell Lake. Implementation of Alternative 1 with other projects current or in the foreseeable future will not further contribute to long term increases in pH of Odell Lake.

Alternatives 2, 3, and 4

Water temperature: None of the actions proposed in any action alternative, when the appropriate mitigation measures are implemented, will negatively affect the water quality. There will be no indirect effects to water temperature from any action alternative, because no trees that provide shade will be removed.

pH: Implementation of any of the action alternatives would have no direct effect to the pH of Odell Lake or Odell Creek. The actions associated with alternatives 2-4 vary little. Snyder et al. (1975) did find that precipitation runoff did leach nutrients from the exposed soil, and provided increased nutrient concentrations directly to the stream. Wemple et al. (1996) demonstrates how road systems can increase peak flow and that drainage ditches can form gullies that lead to streams. Newly created temporary roads using native surface as road beds for harvesting would provide this runoff potential and increased nutrient loading as Snyder et al. (1975) discussed to streams until these roads are restored to a natural condition.

Cumulative effects- pH and water temperature: These action alternatives will not create openings near streams and other waterbodies that would contribute to significant increased insolation in accumulation with other current and foreseeable projects. Odell Lake is bound on two sides by roadless and wilderness areas that are not in the project boundary. No projects in these areas are foreseeable and inflows to Odell Lake would remain in their current condition. The impacts of these alternatives on the terrain within the project area and implementation of appropriate mitigation measures and Best Management Practices will prevent increases in the water temperature of Crescent, Odell, Cold, Big Marsh and Refrigerator Creeks or raise the pH level in Odell Lake and Odell Creek. See mitigation section and list of requirements.

Other ongoing projects such as precommercial thinning and timber sales from the Seven Buttes EA have been designed to not impact the temperature of these streams. No cumulative impact to water temperature is expected.

Aquatic Species

The following discussion is taken from the Biological Assessment that was prepared in accordance with the requirements of FSM 2630.3, FSM 2673.4, and the Endangered Species Act of 1973 as amended. Details of the baseline conditions are in the Fisheries Biological Assessment, on file at the Crescent Ranger District.

Existing Condition

Proposed activities will occur within various locations of the Odell and Crescent basins. Specific locations include along Odell Creek, Crescent Creek, Cold Creek, Big Marsh Creek, and Refrigerator Creek. The Odell basin contains bull trout (*Salvelinus confluentus*) and inland Columbia Basin redband trout (*Oncorhynchus mykiss gairdneri*). The Crescent Basin has historic use of bull trout and is proposed for listing as Critical habitat by the US Fish and Wildlife Service. No historic habitat for spring chinook salmon occur within either basin.

Bull trout primary habitat includes Trapper Creek, Odell Creek, Odell Lake, and Crystal Creek. Trapper and Crystal Creeks are not within the project area and are upstream of any disturbances that would occur. Population numbers in known spawning areas of the Odell Basin are between 50 and 100 spawning adults. Juvenile rearing occurs primarily within Trapper Creek and may occur in Odell Lake and inflow tributaries. For a complete description of bull trout life history and current habitat conditions see the Joint Aquatic and Terrestrial Programmatic Biological Assessment April 2003-April 2006.

Bull trout were once in the Crescent basin but have not been observed since themed 1960s. Habitat included Crescent Lake, Cold Creek, and Crescent Creek. Other potential habitat but no sightings of bull trout have been documented within Big Marsh and Refrigerator Creeks and the upper Little Deschutes River.

Redband trout are found in Odell Creek and Crescent Creek within the project boundary. The Odell Creek population is fairly strong with large numbers of redds documented annually by ODFW. Redband trout in the Crescent drainage are in less secure population status. Years of competition with brown trout and brook trout have displaced redband trout and reduced numbers in Big Marsh Creek and now compete with brook trout in Cold Creek.

Brook trout are no longer stocked in areas within the project boundary to avoid introducing brook trout into bull trout habitat. Brook trout occur in tributaries to Odell Creek and all tributaries to Crescent Creek, and in Crescent Creek.

Effects

Alternative 1

There would be no direct effects with the No Action alternative. No instream work would occur that would directly harm or benefit either bull or redband trout.

Indirect effects would result from allowing natural processes to occur, but would not result in negative impacts to the current fisheries populations. Watershed disturbances such as fire, insects and disease, and flooding have developed the current fish habitats. Maintaining the proper fire regime and keeping upland disturbance to a level that prevents negative effects to stream channels and habitat (through excessive soil compaction or removing recruitable woody debris) will further ensure long-term sustainability of local fish populations.

Cumulatively, the No Action Alternative in combination with current and foreseeable projects would likely have a positive effect on fish populations within the two fifth field watersheds. Current projects within the watersheds include Trapper Creek Restoration, the 25-year multi-agency bull trout recovery plan, and the Crescent Creek Water Quality Restoration Plan. Each of these actions/plans are designed to aid the long-term sustainability of fish habitat and populations. Ongoing vegetation management activities in these watersheds are the Seven Buttes, Seven Buttes Return, and Baja 58 projects. These projects are in some cases treating riparian reserves to enhance and encourage riparian growth and health as well as providing rehabilitation of compacted areas such as dispersed campsites and user-created roads. Projects which could occur in the foreseeable future include: modification or removal of a rock weir structure at the outlet of Odell Lake, implementation of a stream rehabilitation project along the length of Odell Creek, culvert replacements for fish passage on tributaries to Odell Creek, riparian road closures and revegetation of lower Odell Creek within the Davis Fire burn area.

Alternatives 2, 3, and 4

The action alternatives will not directly affect fish or fish populations, because no instream work will be occurring. Indirectly, timber harvest and small tree thinning has the potential to affect fish populations by altering water quality and quantity, and/or by changing the channel morphology.

The project does not propose opening the canopy along stream reaches and will therefore not increase the water temperatures above the current 7-day mean maximum for these streams. Project Design Criteria (PDCs) from the 2003-2006 Joint Programmatic Biological Assessment (USDA and USDI 2003) and Best Management Practices (*see pages 21-22*) are included in the project design and mitigation measures and will prevent negative changes in temperature or sediment levels from indirectly affecting bull trout and/or redband trout habitat in the Crescent and Odell watersheds. Shade and water temperature of the lake will not be altered due to management activities. Only trees

4 inches in diameter or less will be thinned, therefore there should be no change in the riparian canopy or the shade it provides the streams.

The project does occur in potential critical bull trout habitat however, bull trout have been extirpated from the Crescent watershed and have not been documented spawning in the Odell Creek watershed. Juvenile bull trout rearing has been found in tributaries to Odell Creek and in Odell Creek. Bull trout are found in Odell Lake but shade and water temperature will not be altered due to management activities.

No Essential Fish Habitat for spring or fall chinook exists within the project area, and there will therefore be no effect.

Cumulatively, the action alternatives, along with other projects occurring in the planning area, have the potential to temporarily increase the fine sediments entering stream channels. Other projects from the Seven Buttes Return and Baja 58 EAs are treating pockets of riparian reserves to enhance and encourage riparian growth and health, as well as providing rehabilitation of compacted areas such as dispersed campsites. The current project prescribes a 300-foot buffer along perennial streams, wherein only thinning of trees under 4" is allowed. This measure will reduce the potential sedimentation to a negligible level. Current project plans include Trapper Creek Restoration and long-term implementation of the bull trout recovery plan and the Crescent Creek Water Quality Restoration Plan. Each of these plans is designed to aid the long-term sustainability of fish habitat and fish populations. Projects which could occur in the foreseeable future include: modification or removal of a rock weir structure at the outlet of Odell Lake and implementation of a stream rehabilitation project along the length of Odell Creek.

Effects Summary

Bull Trout – *May Effect, Not Likely to Adversely Affect.*

Red Band Trout – *May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species.*

Proposed Bull Trout Critical Habitat – *No Effect.*

Aquatic Conservation Strategy Objectives

The Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan) includes an Aquatic Conservation Strategy. This strategy is intended to protect and restore watersheds and aquatic ecosystems. Watershed Analysis is a component of the Aquatic Conservation Strategy. The area is covered by two different watershed assessments: Odell (1999) and Big Marsh (1997). The following is a discussion of the information from those assessments relevant to the condition of riparian areas.

The Big Marsh Watershed Analysis (WA) identified trends that are occurring in the watershed. These trends are the result of factors which over time influence change on a given element or portion of the ecosystem. The following three trends are relevant to Riparian Reserves:

- Increased fragmentation and reduced connectivity in late and old structure stands and riparian habitats.
- The susceptibility for high severity fires is increasing due to fuels buildup.
- The health of the riparian habitat has been impacted by human activities such as private development, trail and road construction, recreation, grazing, and water diversion.

According to the Big Marsh WA, the health of the riparian areas varies widely within the 5th field watershed. It ranges from very good to poor, and is affected by numerous factors. Past harvest

practices, cattle grazing, roads, land development, and other private land uses in riparian areas have altered the habitat, especially along Crescent Creek. Landscape goals and opportunities identified in the WA address the trends. Objectives within the scope of the current project proposals include accomplishing fuels reduction around summer homes and the Boy Scout Camp; utilize prescribed fire and mechanical fuel reduction to reduce fuel loading in urban interface areas, ponderosa pine, lodgepole pine, and mixed conifer dry; utilize personal use firewood gathering to reduce fuel loading; manage areas for increased resistance to insects, disease and fire; reduce fragmentation by decreasing road density and maintaining adequate access for appropriate fire management, administrative use, private land access, and recreation.

A portion of the following units falls within Riparian Reserves: 2, 6, 7, 10, 12, 14, 18, 20, 25, 26, 27, 28, 30, 33, 38, 41, 42, 45, 47, 49, 52, 55, 61, 62, 64, 66, 67, 68, 70, 71, 72, 76, 77, 79, 80, 81, 84, 88, 90, 92, 100, 101, 102. See Appendix A for a list of the proposed treatments within each unit. Page 21 describes the project design requirements for riparian reserve areas. No mechanized equipment is allowed in these areas. See Table 25 for a comparison of Riparian Reserve entered by Alternative.

Table 25. Treatment acres within Riparian Reserves by Subwatershed

Watershed (5th Field)	Subwatershed (6th Field)	Total Riparian Reserves within Subwatershed	Riparian Reserves included in Alt. 1	Riparian Reserves included in Alt. 2	Riparian Reserves included in Alt. 3	Riparian Reserves included in Alt. 4
Crescent	Cold Creek	190	0	73	73	73
	Crescent Lake	7,170	0	670	670	650
	Middle Crescent	1,356	0	68	68	68
	Big Marsh	1,699	0	167	167	167
	Refrigerator	736	0	69	69	65
Upper Deschutes	Odell Creek	1,892	0	36	36	19
	Odell lake	3,182	0	31	31	31
		Total	0	1,114	1,114	1,073

Riparian Reserve Standards and Guidelines. C-31 through C-38 of the Northwest Forest Plan Record of Decision list Standards and Guidelines for Riparian Reserves that generally prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. The following is a discussion of the relevant standards and guidelines as they relate to the current project.

TM-1: *Prohibit timber harvest, including fuelwood cutting, in Riparian Reserves, except as described below. Riparian Reserve acres shall not be included in calculations of the timber base.*

c. Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS Objectives.

The proposed small-diameter thinning within Riparian Reserves is intended to reduce the stocking levels and reduce the risk of high-severity fire. The Big Marsh Watershed Analysis identifies fragmentation of the riparian areas as a negative trend in the watershed that has impacted the project area, particularly on private land. The riparian zones that remain intact are important to maintain and protect. Commercial timber harvest would not take place under any of the action alternatives. All alternatives comply with this standard and guideline.

RF-2: *For each existing or planned road, meet Aquatic Conservation Strategy objectives by:*

a. minimizing road and landing locations in Riparian Reserves.

b. Completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian Reserves.

c. Preparing road design criteria, elements, and standards that govern construction and reconstruction.

d. Preparing operation and maintenance criteria that govern road operation, maintenance, and management.

e. Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

f. Restricting sidecasting as necessary to prevent the introduction of sediment to streams.

g. Avoiding wetlands entirely when constructing new roads.

Reconstruction of road 6020100 would dictate the development of design standards addressing the need to reconstruct segments found in sensitive riparian situations without contributing adversely to the condition of those riparian areas. The establishment of design elements would include types, sizes, and spacing of culverts to be installed as replacement for the current inadequate structures or in locations where culverts are needed but are not currently present, types of other surface and subsurface structures to be employed to facilitate unencumbered passage of non-channelized overland and subsurface flows, selection of construction materials that would best serve the need of restoring more natural hydrologic processes, and stipulation of construction techniques as necessary to assure the minimization of sediment delivery into riparian areas and stream courses.

The Road Management Objectives (RMO) for road 6020100 would be reviewed in light of the location and likely use patterns. Given that the most likely management strategy for this road is to be suitable for high clearance vehicles during the course of the snow-free season, the RMO would address any seasonal restrictions that may be necessary to protect the stability of the road under extreme conditions and prevent the sorts of road bed failures that could lead to unacceptable sediment supply or other degradation to adjacent riparian or aquatic habitats.

A primary aim in the reconstruction of road 6020100 would be to construct culvert installations, free-draining embankments, and other subgrade and sub-surface treatments that would allow for the relatively unrestrained passage of surface and subsurface flow. Culverts at stream crossings would be designed and constructed so that water would be removed from and placed back into the existing geomorphically stable stream channels, without resorting to construction of any length of new channel at the installation site; in other words, the overriding control in the design and installation of culverts would be the placement of inlets and outlets in existing channels. Other pervious structures such as free-draining fills, underdrains, and other surface and subsurface structures would be designed and constructed to reduce to the degree practicable the retention or interception of surface and subsurface flow in the numerous riparian crossings encountered on this road. The guiding intent would be to restore to the degree possible hydrologic surface and subsurface flow regimes that would be anticipated in the absence of this road bed in these riparian areas.

Given the nature of the work to be performed, it would be unlikely that there would be opportunities, much less need, to be faced with the potential for embankment sidecasting. To assure that sidecasting - with its attendant potential increase in sediment delivery to nearby streams – is avoided, construction specifications would be employed that strictly control embankment placement to within the prism of the existing road within or adjacent to stream crossings or other riparian areas.

RF-3: *Determine the influence of each road on the Aquatic Conservation Strategy Objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:*

a. reconstructing roads and associated drainage features that pose a substantial risk.

b. Prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected.

Watershed Assessments have been completed for the project area (USFS 1997 and USFS 1999). A Roads Analysis was also recently completed for the project area (see page 7). The Roads Analysis looked more specifically at the transportation system and considered the impacts the current transportation system has on ecosystem functions and process. The interdisciplinary process generated recommendations for the transportation system, including improvement and reconstruction on Forest Road 6020-100, based on impacts to riparian resources. Also see discussion under RF-2.

RF-4: *New culverts, bridges, and other stream crossings shall be constructed, and existing culverts, bridges, and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.*

See discussion under RF-2 and RF-3. Where stream crossings will be improved, they will accommodate at least the 100-year flood.

FM-1: *Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuels management activities could be damaging to long-term ecosystem function.*

The fuel treatments in all action alternatives have been designed to minimize disturbance of riparian ground cover and vegetation. See page 23 for a list of project design requirements. No equipment is allowed in the Riparian Reserves and where any small tree thinning occurs, slash piles will be created and burned outside the Riparian Reserves.

FM-4: *Design prescribed burn projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.*

Burning operations will not be allowed within the Riparian Reserves, except where desired to rejuvenate decadent willows in Units 80 and 88. Where encroaching conifers are removed, the slash will be piled on some willows. The burning is expected to increase sprouting.

The following discussion summarizes and provides rationale for meeting or not preventing attainment of ACS Objectives for the Crescent and Upper Deschutes 5th field watersheds for all of the action alternatives.

1. *Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adopted.*

The thinning project focus within the riparian areas is on maintaining these components at the landscape level by enhancing growth and health of the riparian vegetation. Thinning in the 30 to 60-year old densely populated stands will accelerate diversity and the complexity of these areas that are currently in a homogenous state. Removal of small trees in riparian reserves will be limited to areas outside of the stream channel and floodplain – within 30 feet of the stream channel, no thinning will be allowed to protect the stability of the stream channel and floodplain. Thinning is intended to reduce the potential for fire that could damage the riparian zone, and will improve species composition, growth, and stand level diversity desirable in healthy riparian ecosystems.

2. *Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

None of the action alternatives will degrade the drainage network connections between watersheds. No early successional conditions will be created in riparian areas, and limits described in the project design section on activities in riparian reserves will maintain the spatial and temporal connectivity. The alternatives would improve hydrologic conditions and the drainage network by improving drainage on the 100 road. Treated acres within riparian reserves will retain an average of 50 percent canopy closure after thinning. Chemically and physically unobstructed routes critical to the life history of aquatic species will remain intact because of this prescription. Spatial connectivity may be restored for some plants and animal species that cannot survive under dense canopy.

3. *Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

Physical integrity of the aquatic system will be maintained and preserved by applying the no-cut area along streams and excluding equipment from riparian areas. Specific Best Management Practices (BMPs) are T-2 (Harvest Unit Design), T-7 (streamside Management Unit Designation), T-8 (Stream Course Protection). These BMPs maintain the physical integrity of the aquatic system by designating prescriptions (i.e. maintenance of root strength, shade canopy, and large woody material).

4. *Maintain and restore water quality necessary to support a healthy riparian, aquatic, and wetland ecosystem. Water quality must remain in the range that maintains the system biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

The alternatives are designed to not remove any shade-producing trees along streams. Maintaining current canopy cover within riparian reserves is expected to provide shading and maintain stream temperatures. Biological, physical, and chemical integrity of water quality will be maintained using BMPs listed in #3, and by adhering to equipment and cutting restrictions along streams.

5. *Maintain and restore the sediment regime under which the aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of the sediment input, storage, and transport.*

Each alternative would maintain the sediment regime under which these systems evolved. The input of sediments to these streams has typically been through activities directly adjacent to stream courses. By placing a no-cut buffer and restricting equipment from riparian areas, there is little chance of sediment reaching the stream channel. Introduction of sediments will not significantly increase over current levels. Stand density management will accelerate conversion of the riparian reserves to late-successional stand characteristics, resulting in long-term improvements to bank stability and sediment storage capacity provided by increases in in-stream large woody material. Water quality will remain the same or improve as larger trees fall into the riparian area. The action alternatives would begin to restore the sediment regime to a more natural, episodic level through road repair maintenance that would reduce the likelihood of chronic, road-related sediment directly entering the stream channel.

6. *Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

None of the action alternatives is expected to affect base of high flow conditions. See section on Cumulative Watershed Impacts. Equivalent Clearcut values for this planning area will remain above recommended values. The timing, magnitude, duration, and spatial distribution of flows will be maintained. All wet areas will be protected by not allowing equipment.

7. *Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.*

The proposed activities are expected to have minimal effects on low flow conditions. Thinning treatments in riparian reserves are not expected to have any effect on floodplains or water table elevations. ECA values for this planning area will remain above recommended values (see page 79).

8. *Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration, and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability.*

The existing species composition will be maintained or enhanced by the proposed thinning activities in Alternatives 2, 3, and 4. All action alternatives will begin the restoration of riparian vegetation diversity by prescribed thinning, which will increase the growth and health of overstory trees to generally increase structural diversity and provide for a more rapid development of future sources of large woody material into the stream channel. Biological, physical, and chemical integrity of water quality will remain intact by maintaining current canopy cover and streamside shade within riparian reserves.

9. *Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.*

There is no regeneration timber harvest proposed in any action alternative that would eliminate or retard the development of habitat to support well distributed populations of any invertebrate or vertebrate riparian dependent wildlife species. All action alternatives however do propose some level of silvicultural treatment within riparian zones to maintain and/or enhance late-successional forested habitat where desired. This would be accomplished through understory thinning and salvage of some dead and down material to reduce fuel accumulations. These actions would reduce the likelihood of a catastrophic wildfire completely altering the character of riparian habitats and associated wildlife species. The treatments specified would allow greater tree growth of retention trees and maintain and enhance the understory component of shrubs, forbs, and grasses important for many terrestrial species. Mitigation measures have been prescribed for the retention of snags, coarse woody debris and no cut stream buffers and would be incorporated into each project or sale contract.

Hydrologic Recovery Analysis (Equivalent Clearcut Area)

Method

The potential for cumulative effects of management activities on increases in peak stream flow were analyzed with the Equivalent Clearcut Area (ECA) methodology. Hydrologic recovery as measured by ECA refers to a procedure devised to estimate the ability of a drainage to accept a "rain-on-snow" event without significant impacts to the stream channels. ECA values are defined as the percentage of a drainage area that does not have trees with enough basal area to hold and transpire snow before it accumulates on the ground. This approach analyzes the watershed in terms of canopy closure, open road density and impact to vegetation from fires that have occurred in the last 60 years. Rapid melting of the snow pack in open areas, (e.g. clear cuts or roads) from already supersaturated or frozen soils can cause downstream consequences. Changes in peak flows have been documented when a watershed approaches 25 to 30 percent clear-cut (Cheng 1989, King 1989). With this change in peak flows, there is the potential to alter stream channel stability and the amount of sediment being transported. Changes in evapo-transpiration that results in higher season stream flows have been document in watersheds approaching 25 percent clear-cut (Troendle et. al. 1998).

Existing Condition

Rates of recovery in canopy cover after clear-cut harvest in lodge pole pine stands range between 50 to 60 years. In mixed conifer stands with a single story, recovery rates increase to approximately 80 plus years. Table 26 shows current Equivalent Clear-cut acres for all the 6th field watersheds. The figures for the Odell Creek and Middle Crescent watersheds take into account the Davis Fire of July 2003 that burned 2,995 acres within those drainages. A portion of the 2003 Davis Fire occurred in Odell Creek subwatershed. Pre-fire ECA was 16%; the fire increased the ECA value to 30.5%.

Table 26. ECA Values for Project Area Watersheds

6th Field Watershed	Current ECA (%)
Big Marsh	18.5
Crescent Lake	4.2
Middle Crescent	23.9
Odell Creek	30.5
Odell Lake	2.8
Refrigerator Creek	5.8
Cold Creek	0.9

Effects

The hydrologic recovery was calculated using the year 2006 as the estimated year of implementation. Because only a small percent of the total area in the watersheds will be thinned with this project, the percentages of ECA will not be changed significantly by any action alternative. The proposed thinning will have little to no effect on peak flows. The table on the following page compares ECA in each subwatershed by the alternatives.

Table 27. Equivalent Clearcut Acres Resulting from Each Alternative

6th Field Watershed	Alt. 1 ECA (%)	Alt. 2 ECA (%)	Alt. 3 ECA (%)	Alt. 4 ECA (%)
Big Marsh	18.5	18.9	19.0	18.8
Crescent Lake	4.2	6.0	7.2	5.4
Middle Crescent	23.97	24.16	24.36	24.08
Odell Creek	30.48	30.93	31.05	30.62
Odell Lake	2.78	2.89	2.97	2.8
Refrigerator Creek	5.82	5.82	5.82	5.82
Cold Creek	0.91	1.67	1.85	1.07

Except for Odell Creek and Middle Crescent subwatersheds, ECA values are below threshold concerns in all subwatersheds in the project area. The risk of increases in peak flows from action alternatives in the project area is not anticipated to be significant enough to cause changes in stream channel stability.

The ECA values for all alternatives are below the threshold levels of concern. No risk of increases in peak flows from the project alternatives is anticipated. Alternative 3 has a slightly higher value than the other two alternatives, primarily in the Crescent Lake watershed (2% more), but the ECA level is still very low.

Cumulative

The Odell Creek subwatershed has an ECA value of 30.548. The action alternatives will raise that value by 0.45 (Alt. 2), 0.57 (Alt. 3), or 0.14 (Alt. 4). Because of the loss of live vegetation in the fire area the Odell Creek subwatershed may have an increase in water yield, due to decreased evapotranspiration and decreased interception of snow. This water yield increase will be released gradually into the ground water surrounding Davis Lake or the lower reaches of Odell Creek. The fire occurred in the most downstream area of Odell Creek and increases in peak flows or annual water yields will not have an adverse effect on Odell Creek. It is unlikely that this increase in water yield will be significant enough to alter the physical characteristic of Odell Creek inside the fire perimeter. The increase in water yield is expected to occur subsurface and during spring melting.

There would be no significant increase in ECA values in any of the other subwatersheds.

Wild and Scenic River Corridor

Existing Condition

Crescent Creek and Big Marsh Creek are part of the National Wild and Scenic River System. Vegetation and scenery were determined to be the outstandingly remarkable values (ORV) for this stretch of Crescent Creek, and vegetation, scenery, and wildlife are the ORVs for Big marsh Creek. The Wild and Scenic Rivers Act requires that these values and other river-related values be protected and enhanced. Interim guidelines in the Deschutes LRMP apply to management in the Crescent Creek corridor and require that harvest of trees will be oriented towards enhancement of scenic, hydrologic, fisheries, recreational, and/or wildlife values. A site-specific Management Plan has been prepared for Big Marsh Creek (USFS 2001) that replaces the interim guidelines in the LRMP.

Effects

No units are located within the wild and scenic corridor of Big Marsh Creek. Therefore, no activities will take place within the Wild and Scenic Corridor and there will be no direct, indirect, or cumulative effects from any of the action alternatives on the ORVs.

The interim corridor for Crescent Creek is ¼ mile on either side of the river. Portions of the following units fall within the Wild and Scenic interim corridor: 12, 18, 20, 22, 25, 26, 27, 28, 30, 33, 41, 42, and 45. A total of 623 acres would be thinned, with slash piled and burned, chipped, or otherwise utilized. The vegetation scenery ORV will be protected and enhanced through these vegetative and fuels reduction activities by reducing the potential impact of a large-scale fire encroaching on the corridor and by improving the growth of larger trees. Scenic view criteria listed in Chapter 2 will be applied within the corridor where necessary to maintain a visual management objective of partial retention.

SOIL QUALITY

The potential effects, both physical and biological changes in soil productivity, are primarily a function of the types of disturbance, the timing and location of activities, and the inherent properties of the various soils within affected areas. It is the cumulative effect of repeated impactive entries over a long period of time that has the greatest potential of lowering soil productivity on forest sites.

Existing Condition and Management Direction

Soils in the Crescent WUI project area are strongly influenced by materials deposited by volcanic eruptions, including volcanic ash, pumice and cinders. Mount Mazama (about 7,000 years ago) was the

main volcanic event that influenced the soils in this area. These materials fell upon previously developed soils, and which now underlie the Mazama pumice and ash at depths from 40 to greater than 60 inches.

The dominant landtypes within the project area are well to excessively drained. Surface soils are pumiceous loamy sands and sands. The underlying buried soils are sandy loams to sands; some containing cobbles and stones. Permeability is very rapid in the surface soil and moderate to very rapid in the buried soil. Depth to bedrock ranges from 20 inches (moderately deep) to greater than 60 inches (very deep). Sensitive soils, wet soils, and a high water table occur throughout the project area.

The Forest Plan standards and guidelines direct that all management ground-disturbing activities maintain or enhance long-term soil productivity (SL-1), and that 80 percent of an activity area must be in acceptable soil condition after the activity is completed (SL-2). This includes all system roads, landing, spur roads, and skid trails. Standard and guideline SL-4 requires that where this direction cannot be met, the site will be rehabilitated to bring the soil productivity to within acceptable limits. Forest Plan standard and guideline SL-5 requires special consideration when mechanical equipment is used on sensitive soils. When sensitive soils are encountered, mechanical equipment will be restricted to slopes that are less than thirty percent, existing skid trails, and landings.

Regional Standards and Guidelines (FSM 2500, R-6 Supplement 2500-98-1) describe conditions detrimental to soil productivity and outlines Soil Quality Standards to limit the extent of these conditions to less than 20% of an activity area. The Region 6 Supplement also includes policy direction for designing and implementing management practices that maintain or improve soil and water quality. An emphasis is placed on protection over restoration.

Figure 9 on the following page displays soil types within the project area. The soil codes are described in the Soil Resource Inventory (Larsen 1979). Sensitive soils and the proposed treatment units are also designated on the map.

Past harvest and road building have impacted soils in the project area. Detrimental soil conditions from past activities will be discussed by 6th field watershed. Locations of activities, GIS data queries, past monitoring, and field visits were used to evaluate the existing condition of soils in the project area. Information on methodology used to determine current impacts from past management activities can be found in the Soil Specialist Report.

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Figure 10. Soil Types within Project Area

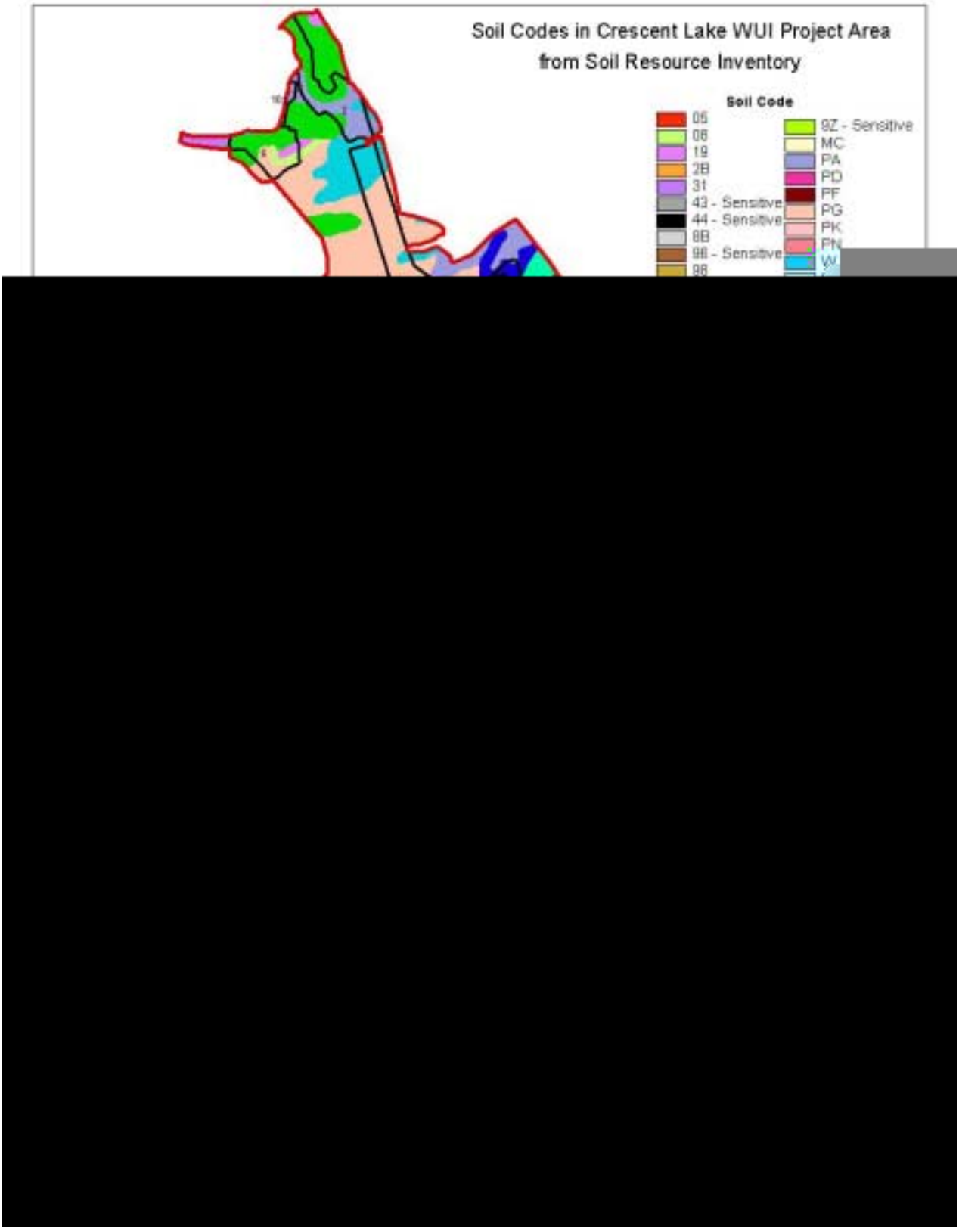

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Table 28. Existing Soil Conditions by Watershed

6th Field Watershed	Total Watershed Acres	Total Acres of Past Harvest Activity	Estimated Acres of Detrimental Soil Conditions	Percent of 6th Field Watershed in Detrimental Soil Condition
Big Marsh	13,763	3,707	732	5
Crescent Lake	23,972	1,230	263	<1.0
Middle Crescent	17,775	6,952	1,758	9.8
Odell Creek	15,060	4,400	1,037	6
Odell Lake	17,280	526	89	<1.0
Refrigerator Creek	5,754	597	140	2.0
Cold Creek	6,050	66	19	<1.0

Effects

Timber harvest and associated activities have the potential to directly affect soils (i.e., compaction and/or displacement). Such effects can be mitigated by requiring that pre-existing landings and skid trails be utilized when ever possible. When a unit does not meet Regional and Forest standards and guidelines, restoration activities will be applied to those areas. Tables B-1 through B-4 in Appendix B display the current condition for each unit and the expected effects to the soil resource by each alternative.

Alternative 1

There would be no direct impacts to the soil resource under the No Action Alternative. The soil quality within watersheds would remain at its current level displayed in Table 28. Fire hazard would continue to grow, and in the event of a wildfire, soil productivity could be impacted riparian areas could be damaged.

Alternative 2

Alternative 2 proposes commercial and precommercial thinning, and hand and machine piling as shown in Table 2. In addition, this alternative proposes to build 4.17 miles of temporary road if a new 1.98-mile of system road is constructed to access units, or build 5.8 miles of temporary road if the new system road is not built. The ground disturbing activities in this alternative would have a direct effect to 628 acres of soils through compaction and a minor amount of displacement.

Machine operations can cause soil compaction, duff disturbance, and erosion. Current practices would leave some small woody debris as short-term nutrient source and leave up to 7 logs per acre of large woody debris for long-term nutrient cycling. Soil compaction can occur where heavy machinery repeatedly operates over the same section of ground. Mitigations such as using grapple pile equipment that has 5 psi or less ground pressure capabilities will reduce the amount of soil compaction.

High severity burning of soils can occur when soil moisture is dry and can cause loss of nutrients and erosion. Severe scorching can have a detrimental effect on soil aggregation and mycorrhizal development. Current practices of spring burning rarely result in high severity burns to soils. Past experience has shown that prescribed burning generally retains 50 – 80% of the duff layer and 75% or more of the large wood component.

Pile burning can cause soil damage beneath the piles. The amount of damage depends on soil type, soil moisture at time of burning, the amount of large fuel in a pile, and the amount of dirt in a pile. Damage is more likely to occur under a landing pile since these tend to be large and generally contain large pieces of fuel. Piles are usually constructed when soils are relatively dry and the amount of moisture that can reach the soil beneath a pile can be limited prior to burning piles. Since damage is restricted to the area beneath piles, the impact over the entire area would be minimal.

Indirect effects from ground disturbing activities, such as increases in peak flow from a rain on snow event, are highly unlikely to occur because the amount of ground disturbance is low compared to the size of the watersheds, and thinning will not significantly move Equivalent Clearcut Acres above current conditions.

Cumulative Effects

Previous harvest and road activities are included in the current condition assessment for detrimental soil condition. Cumulative effects of this alternative will not have an effect on soil resources. Applying Best Management practices (BMPs), required mitigation measures, Regional and Forest soil quality standards, Forest Plan standards and guidelines and implementation monitoring would assure that no adverse effects would occur to soil or water quality.

Alternative 3

Alternative 3 proposes commercial and precommercial thinning and machine and hand piling followed by burning, as shown in Table 2, page 14. In addition, this alternative proposes to build 6.10 miles of temporary road, but if 1.98 mile of new road construction is not built then this alternative would build 7.73 miles of temporary road. The ground disturbing activities in this alternative would directly affect 855 acres of soils with compaction and a minor amount of displacement.

Indirect effects from ground disturbing activities, such as increases in peak flow from a rain on snow event, are highly unlikely since the amount of ground disturbance is low and thinning will not significantly change Equivalent Clearcut Acres above current conditions.

Cumulative Effects

See Table B-3 in Appendix B, which displays the existing detrimental compaction for each unit, and the additional disturbance expected after project activities.

Cumulatively this alternative will not have significant effects on soil resources. Applying Best Management practices (BMPs), required mitigation measures, Regional and Forest soil quality standards, Forest Plan standards and guidelines and implementation monitoring would assure that no adverse effects would occur to soil.

Alternative 4

Alternative 4 proposes activities as shown in Table 2, page 14. In addition, this alternative proposes to build 3.68 miles of temporary road, but if 1.98 mile of new road construction is not built then this alternative would build 5.31 miles of temporary road. The ground disturbing activities in this alternative would have a direct effect of compaction on 506 acres of soils, and a minor amount of displacement. Alternative 4 has the least amount of direct soil impacts compared to the other two action alternatives.

Cumulative Effects

See Table B-4 in Appendix B, which displays the existing detrimental compaction for each unit, and the additional disturbance expected after project activities.

Cumulatively this alternative will not have significant effects on soil resources. Applying Best Management practices (BMPs), required mitigation measures, Regional and Forest soil quality

standards, Forest Plan standards and guidelines and implementation monitoring would assure that no adverse effects would occur to soil.

BOTANY

Proposed, Endangered, Threatened, or Sensitive Plants

Plant surveys were conducted in the project area. No Proposed, Endangered, Threatened, or Sensitive Plant species were located during surveys of the project area. Records show one species of PETS plant, *Astragalus peckii*, has known sites *near* the project area and potential habitat in the project area. No sites for *Astragalus peckii* or any other PETS plants were found during surveys in any of the activity units. See the Botany Report for more detailed information on surveys and habitat descriptions.

No activities proposed in any of the alternatives in the project will have direct, indirect, or cumulative impacts to habitat or sites, for any species on the Regional Forester's Sensitive plant list that are documented or suspected to occur on the Crescent Ranger District.

Survey and Manage Plants

A pre-field review determined the following species would require surveys: *Botrychium minganense, Botrychium montanum, Schistostega pennata, Tetraphis geniculata, Pseudocyphellaria rainierensis,* and *Bridgeoporus nobilissmus.* These are species that require surveys and have potential habitat within the planning area. Surveys were conducted in the project and none of these species were located. There will be no impacts to any of these species from any alternative.

One survey and manage species that does not require surveys (*Bryoria tortuosa),* has known sites near the project, but outside of an activity unit. The treatments proposed in all action alternatives will have no direct, indirect, or cumulative detrimental effects to the known site for *Bryoria tortuosa* and may promote habitat in the long-term for possible colonization in the future as the trees in Unit 37 mature.

OTHER ENVIRONMENTAL CONSEQUENCES

Air Quality and Smoke Management

The proposed fuel treatments could include up to approximately 3,450 acres of pile burning. Smoke generated from these treatments could affect populated areas if smoke intrusions were to occur. Burning forest fuels discharges many chemical compounds into the atmosphere including carbon monoxide, total suspended particulates, hydrocarbons, nitrogen oxides, and water vapor. Inhalation of smoke can cause acute or chronic damage to health. Timing and season of burning can be used to mitigate impacts. PM5, measured in tons, is used to evaluate the effects of the alternatives.

Air quality can be affected by both prescribed fire and wildfire. National Ambient Air Quality Standards have been developed and include standards for total suspended particulates (solid material contained in smoke). PM10 is particulate matter that measures 10 micrometers in diameter class or less. PM 2.5 is particulate matter that measures 2.5 micrometers in diameter or less. CO is carbon monoxide. Table 29 below displays the amount of emissions produced by particular fire and fuels activities within the last 5 years in the project area.

Table 29. Emission Produced in the Project Area within the Last 5 Years

Fire Type	Acres Burned	PM 10 (lbs/ac)	PM 2.5 (lbs/ac)	CO (lbs/ac)
Hand/Machine Piles	390	149	134	1,322
Landing Piles	6	75	67	666
Underburning	0	0	0	0
Wildfire	4	410	361	2,919
TOTAL	**400**	**643**	**562**	**4,907**

Wildfires have produced the majority of emissions from the project area.

This area is generally influenced by south and westerly winds from early to late afternoon. During the late fall and winter months (Nov.-Feb.) inversions area are common but tend to dissipate by mid-morning. Areas that potentially could have impacts from burning operations are Crescent Lake Junction, Hwy 58, Crescent Lake, Two Rivers, and Odell Lake. Other methods of disposal, such as chipping will be considered across the project area, as appropriate.

Effects

Alternative 1

Prescribed fire activities, pile burning and natural fuel underburning, would not occur. There would be no emissions produced from management activities as a result of implementing this alternative. Wildfires would continue to produce high levels of emissions in untreated areas.

Alternatives 2, 3, and 4

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

Prescribed fire would be conducted under favorable smoke dispersal conditions, avoiding impacts to Class 1 airsheds and urban areas. Inversion conditions, which would increase the potential for smoke pooling in valleys and drainages, would be avoided during prescribed fire operations.

Proposed fire activities would be implemented over a period of about 5 years. The majority of thinning slash (if not treated by chipping) would likely be burned during the middle years of the implementation period. Table 30 on the following page displays the estimated total annual emissions over the 5-year implementation period. Units are total tons.

Table 30. Predicted Emission Levels in tons

Alternative	2004	2005	2006	2007	2008
Alternative 1					
PM 10	0	0	0	0	0
PM 2.5	0	0	0	0	0
CO	0	0	0	0	0
Alternative 2					
PM 10	19	97	97	86	11
PM2.5	17	88	88	77	10
CO	165	868	868	765	101
Alternative 3					
PM10	19	114	114	93	17
PM2.5	17	102	102	83	15
CO	168	1,007	1,007	821	152
Alternative 4					
PM10	19	93	93	74	6
PM2.5	17	84	84	67	5
CO	165	830	830	661	52

Alternative 2 would produce an estimated 3,357 tons of total suspended particulates (TSP) over the 5-year implementation period. Alternatives 3 and 4 would produce 3,831 and 3,080 tons, respectively.

Prescribed fire treatments would eliminate the accumulation of fuel in the project area. With a reduction in fuel levels, the intensity of wildfires and the amount of emissions they produce is expected to decrease.

Cumulative Effects All Alternatives

Wildfires and other prescribed fire activities associated with Baja 58 and Seven Buttes Return planning areas would produce some emissions in and around the planning area. Based on the average number of acres burned and the average emissions over the last 5 years an estimated .75 acres would burn each year, with an estimated emission of 308 lbs of PM 10.

Noxious Weeds

Aggressive non-native plants, or noxious weeds, can invade and displace native plant communities causing long-lasting management problems. There are known populations of noxious weed within

proposed treatment units. Ground disturbing activities have the potential to spread noxious weeds. Evaluation criteria are the possibility of spread and the amount of ground disturbance and exposure.

A Noxious Weed Risk Assessment was prepared for the Crescent Lake WUI Project (see Botany Report). For projects that have a moderate to high risk of introducing or spreading noxious weeds, recent Forest Service policy requires that decision documents must identify noxious weed prevention practices and control measures that will be undertaken during implementation. Surveys for noxious weeds were conducted in the project area. Results of that survey and consideration of risk assessment factors lead to the determination that there is a High Risk of the introduction and spread of noxious weeds in the project area.

Page 25, Required Mitigation for Noxious Weeds, provides weed prevention practices that are required during implementation of the project such as cleaning equipment and entering weed-free units first. By following these prevention practices, the risk of the introduction, establishment, and spread of noxious weeds associated with activities in the project area will be reduced to a LOW level. These practices have been implemented in other projects, and have been determined to be feasible, effective, and cost-effective.

Cultural Resources

There is a risk of loss of integrity at eligible historic properties or unevaluated historic properties due to treatment activities using mechanical equipment. Mitigation will be incorporated to assure that cultural resource values are preserved using appropriate methods and procedures. In most cases, this will be accomplished by avoidance. The level of site integrity is used for measuring the impacts to cultural resources.

For all action alternatives, projects are designed to reach a determination of No Effect or No Adverse Effect to cultural resource sites. No Adverse Effect requires mitigation plans to be developed to keep impacts within the process called for in Federal law, regulation, and Forest Service agreements with the Advisory Council on Historic Preservation. Sites will be flagged and avoided, and in some instances unit boundaries will be adjusted to avoid sites. Consultation and compliance with Oregon SHPO will be completed.

Financial Efficiency

For all timber harvest components of the project, consideration must be given to the financial efficiency of the proposed action and alternatives. As directed by FSM 1970 and FSH 2409.18 (Amend 2409.18-95-2), a financial review has been conducted for the timber harvest expected to result from vegetation treatments proposed in the Crescent Lake WUI Project area.

The purpose of this analysis is to use the best information available regarding costs and revenues to provide the decision maker with an understanding of the economic and social costs/benefits of the proposed action and alternatives. Exact revenues will depend upon actual selling values, which vary considerably. Exact costs are also dependent upon several variables that can only be known once the actual timber sale is cruised. Therefore, the chief function of this analysis is to provide a comparison of alternatives. It does not provide an absolute representation of the net worth of a given alternative.

Summary values are displayed here. A full description of assumptions and values used for this analysis is located in the project file.

Table 31. Relative Financial Results of all Treatments.

	Alternative 2	Alternative 3	Alternative 4
Gross Acres in harvest units	2,602	2,683	2,489
Net Acres harvested (15% retention; riparian reserves avoided)	1,774	1,843	1,693
Volume harvested (mmbf)	2,345	3,043	2,001
Revenues	143,749	186,536	122,661
Costs	301,931	349,521	284,011
Present Net Worth (PNV)	-158,182	-162,985	-161,350
Benefit-Cost Ratio: All	0.476	0.534	0.432

Fungi Harvest

The harvest of matsutake mushrooms occurs within the project area. This topic was not raised by the public during initial scoping; however, a discussion of the potential impacts of vegetation treatments to the mushroom harvest seems appropriate because mushroom harvesting takes place in the project area during the matsutake season. The commercial harvest of American matsutake (*Tricholoma magnivelare*) from forests in the Pacific Northwest, and especially on the Crescent Ranger District, has increased dramatically in the last decade. The similarity of this mushroom to the Japanese matsutake has prompted its harvest to meet increasing demands for matsutaki in Japan.

Research indicates matsutake have adapted to a wide variety of soils, climates, host trees, and fungal competitors. They fruit abundantly in stands that are uneven-aged, have many canopy layers, and consist of multiple tree species. Productivity varies from site to site, and many of the factors influencing this variation are unknown, although age and species of host trees (such as lodgepole pine and grand fir) are important. Some stand treatments may remove the photosynthetic host and energy source on which the matsutake depends (Hosford 1997).

Alternative 1

Alternative 1 would be the least favorable for promotion of matsutake habitat in the long-term. Natural succession would continue with sunlight to the forest floor progressively becoming diminished as trees and ground vegetation fills up available space. A stand-replacement event, resulting from a large-scale disturbance such as wildfire would likely remove matsutake habitat for decades.

Alternatives 2, 3, and 4

The action alternatives would generally favor understory thinning, allowing an increase in light penetration, air circulation, and a reduction in soil moisture. The three action alternatives provide appropriate soil protection by following Best Management Practices, Regional and Forest soil quality standards, and Forest Plan direction, as well as specific mitigation measures. At the present time, it is difficult to predict long-term effects of thinning on the survival and health of matsutake populations until the genetic structure, dispersal mechanisms, and reproductive strategies of the fungus are better understood.

Reasonably Foreseeable Future Actions within and Adjacent to the Project Area

Analysis of cumulative impacts is included as appropriate to each specialist evaluation. The following is a list of projects and activities that were considered in those reviews because they are near or within the project area, and are likely to occur during the same time as implementation of the Crescent Lake WUI project.

- **Precommercial thinning:** Across the project area, managed plantations have been planned for precommercial thinning through categorical exclusions. These units are expected to be thinned over the next five years.
- **Baja 58 Environmental Assessment:** The Baja 58 EA project area overlaps the current project area. Timber Sales within Crescent Lake WUI project area include: Critter and Camp Fiber.
- **Seven Buttes Return Environmental Assessments:** The Seven Buttes Return project area overlaps the north end of the current project area. Timber Sales in Crescent Lake WUI project area include Royal, Haven, and Tums.
- **Davis Fire:** The Davis Fire recently burned approximately 21,000 acres to the northeast of the project area. A portion of the fire area is located in the Odell Creek and Middle Crescent Watersheds, which the current project shares. An Environmental Impact Statement is being prepared which analyzes timber salvage, fuels reduction, rehabilitation of riparian areas, and tree planting.

OTHER DISCLOSURES

Wetlands and Floodplains

The effects on wetlands and floodplains are described on pages 70 – 78 under the Riparian and Aquatic Components section. To summarize, project design measures are in place to protect riparian areas and activities proposed under the action alternatives are expected to benefit the riparian areas by improving growth of trees and reducing the risk of high-severity fire, which could degrade riparian habitats.

Prime Farmland, Rangeland, and Forestland

The Secretary of Agriculture issued memorandum 1827 which is intended to protect prime farm lands and rangelands. The project area does not contain any prime farmlands or rangelands. Prime forestland is not applicable to lands within the National Forest System. National Forest System lands would be managed with consideration of the impacts on adjacent private lands. Prime forestlands on private lands in the project area would benefit indirectly from a decreased risk of impacts from wildfire.

Civil Rights and Environmental Justice

Civil Rights legislation and Executive Order 12898 (Environmental Justice) direct an analysis of the proposed alternatives as they relate to specific subsets of the American population. The subsets of the general population include ethnic minorities, people with disabilities, and low-income groups. The project is not located in a minority community and would not affect residents of low or moderate income. Therefore the proposed action would not pose a disproportionately high or adverse effect to those populations.

The effects of this project on the social context of these protected groups are within those described in the Deschutes National Forest Plan. The benefits and risks associated with implementation of any alternative are provided to all members of the public. Therefore, the action alternatives would not pose disproportionately high or adverse effects to minority communities or to low income groups.

Consumers

Forest products resulting from the proposed activities would be supplied to the purchaser and indirectly to the public by all of the action alternatives. The impacts to consumers of these forest products is likely

to be minor because the products supplied by this project represent a fraction of the total forest products supplied to the consumers of this region.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

Under Alternative 1 (No Action) there would be no irreversible or irretrievable commitments of resources. The Action Alternatives include some temporary road construction and landings that would remove these specific sites from development of forest habitat or from timber production. Removal of vegetation is an irretrievable impact. The vegetation could return to the current condition if not maintained. The construction and use of roads and logging facilities is considered irretrievable loss of soil productivity until their functions have been served and disturbed sites are returned to their productive capacity.

Inventoried Roadless Areas and Wilderness

The project area does not contain any Inventoried Roadless Areas or any Wilderness. The Diamond Peak Wilderness is adjacent to the northwest side of the project area, and may benefit from a reduced risk of catastrophic fire in the vicinity. Unit 28 lies adjacent to the Wilderness boundary. Fuels reduction may improve the ability to fight fire coming from the wilderness or heading towards it. A project to create barriers to OHV and other motorized/mechanized vehicles that can easily access the Wilderness is currently in the planning stages.

Consultation with Others

Public Notification

Initial Scoping

Appendix D lists all of the people, organizations, and agencies that were sent notification of project scoping and notice of availability of the Environmental Assessment.

In addition to notifying people on the Crescent Ranger District's NEPA mailing list, an effort was made to notify all property owners within the project area. Approximately 500 letters were sent based on Klamath County tax records.

A total of 19 comments were received during the initial scoping period. Some of the people voiced support for the fuels reduction project, and some had concerns about environmental impacts. Other commenters were interested in stewardship opportunities. The Interdisciplinary Team addressed these comments by making adjustments to the project design, or by developing alternatives to the proposed action. Water quality concerns are addressed with project design and mitigation measures; spotted owl habitat concerns are addressed with Alternative 4 and by increasing retention areas to 20% on several units;

Public Participation

During the initial scoping, a number of comments and questions were received. Responses varied from those who wanted more clarification to specific suggestions for project implementation. Comments were used to help develop the planning issues and alternatives.

Those who contacted us about the proposed action include:

Brian Fuller	Bill Priaulx
Lloyd Goff	Oregon Natural Resources Council
Vern Oden	American Forest Resource Council
Francis Deets	William and Joan Davis
Richard Sirgusa	Patrick Gisler
Dale Lander	Chuck Smith
Dean Abbot	Jack Watson
Ochoco Lumber	John McDonald
Michael Petrusha	Phet Thavisack
Fred Getsky	Cliff Burke

Ron Sommerfeld, Walker Range Fire Protection Association

Interdisciplinary Team

The interdisciplinary team members that completed the Environmental Assessment and prepared this document are:

Beth Peer, Team Leader
John Erwert, Fuels Specialist
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Other people consulted during the preparation of this EA are:

Barb Haxby, GIS Coordinator
Ken Boucher, Fuels Specialist
Paul Powers, Fisheries Biologist

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Appendix A
Treatment Units

UNIT	FUELS TRMT	Alt 2 acres	Alt2 RX	Alt2 Nat. Fuels	Alt 3 acres	Alt3 RX	Alt3 Nat. Fuels	Alt 4 acres	Alt4 RX	Alt 4 Nat. Fuels
2	HP/GP	102	HTH/HSV PCT	UB (NORTH)	102	HTH/HSV PCT	UB (NORTH)	56.8	HTH/HSV PCT	
6	HP/GP	68.1	PCT		68.1	HTH PCT		58.1	PCT	
7	HP/GP	238.8	HTH/HSV PCT		238.8	HTH/HSV PCT		238.8	PCT	
10	HP/GP	128.4	HTH PCT		128.4	HTH PCT		128.4	HTH PCT	
12	HP/GP	139	HTH/HSV PCT		139	HTH/HSV PCT		139	PCT	
14	HP/GP	16.6	PCT		16.6	PCT		16.6	PCT	
15	HP/GP	11.6	PCT	MOW	11.6	PCT	MOW	11.6	PCT	MOW
17	HP/GP	3.6	PCT	MOW	3.6	PCT	MOW	3.6	PCT	MOW
18	HP/GP	62.8	PCT		62.8	HTH PCT		62.8	PCT	
19	HP/GP	138.4	PCT	MOW	138.4	PCT	MOW	138.4	PCT	MOW
20	HP/GP	72.9	HTH PCT		72.9	HTH PCT		72.9	PCT	
22	HP/GP	29.9	PCT		29.9	HTH PCT		29.9	PCT	
23	HP/GP	52.7	PCT		52.7	PCT		52.7	PCT	
25	HP/GP	15.2	PCT		15.2	PCT		15.2	PCT	
26	HP/GP	33.4	PCT		33.4	HTH PCT		33.4	PCT	
27	HP/GP	22.4	PCT		22.4	PCT		22.4	PCT	
28	HP/GP	245.2	PCT		245.2	HTH PCT		245.2	PCT	

UNIT	FUELS TRMT	Alt 2 acres	Alt2 RX	Alt2 Nat. Fuels	Alt 3 acres	Alt3 RX	Alt3 Nat. Fuels	Alt 4 acres	Alt4 RX	Alt 4 Nat. Fuels
29	HP/GP	10.9	PCT	MOW/PRUNE	10.9	PCT	MOW/PRUNE	10.9	PCT	MOW/PRUNE
30	HP/GP	35.5	HTH PCT		35.5	HTH PCT		35.5	HTH PCT	
31	HP/GP	32.3	PCT	PRUNE	32.3	PCT	PRUNE	32.3	PCT	PRUNE
32	HP/GP	14.5	PCT		14.5	HTH PCT		14.5	PCT	
33	HP/GP	170.5	HTH PCT		170.5	HTH PCT		170.5	HTH PCT	
34	HP/GP	35.9	PCT		35.9	HTH PCT		35.9	PCT	
35	HP/GP	21.8	PCT		21.8	PCT		21.8	PCT	
36	HP/GP	15.5	PCT		15.5	HTH PCT		15.5	PCT	
37	HP/GP	11.7	PCT		11.7	PCT		11.7	PCT	
38	HP/GP	61.2	HTH PCT		61.2	HTH PCT		61.2	HTH PCT	
39	HP/GP	3.9	PCT		3.9	HTH PCT		3.9	PCT	
40	HP/GP	17.8	PCT		17.8	PCT		17.8	PCT	
41	HP/GP	231	HTH PCT		231	HTH PCT		231	HTH PCT	
42	HP/GP	73.9	PCT		73.9	HTH PCT		73.9	PCT	
43	HP/GP	8.6	PCT		8.6	HTH PCT		8.6	PCT	
45	HP/GP	49.5	HTH PCT		49.5	HTH PCT		49.5	HTH PCT	

UNIT	FUELS TRMT	Alt 2 acres	Alt2 RX	Alt2 Nat. Fuels	Alt 3 acres	Alt3 RX	Alt3 Nat. Fuels	Alt 4 acres	Alt4 RX	Alt 4 Nat. Fuels
46	HP/GP	20.3	PCT		20.3	PCT		20.3	PCT	
47	HP/GP	11.5	PCT		11.5	PCT		11.5	PCT	
49	HP/GP	121.3	HTH PCT		121.3	HTH PCT		121.3	HTH PCT	
51	HP/GP	5.8	PCT		5.8	PCT		5.8	PCT	
52	HP/GP	17.2	HTH PCT		17.2	HTH PCT		17.2	PCT	
55	HP/GP	11.7	HTH PCT		43.8	HTH PCT		11.7	HTH PCT	
56	HP/GP	53.1	HTH PCT		53.1	HTH PCT		53.1	PCT	
57	HP/GP	18.4	PCT		18.4	PCT		18.4	PCT	
58	HP/GP	4.3	PCT							
60	HP/GP	9.6	PCT		9.6	HTH PCT		9.6	PCT	
61	HP/GP	113.9	PCT		113.9	PCT		113.9	PCT	
62	HP/GP	6.7	HTH PCT		6.7	HTH PCT		6.7	HTH PCT	
64	HP/GP	35.9	HTH PCT		35.9	HTH PCT		35.9	HTH PCT	
66	HP/GP	22.1	HTH PCT							
67	HP/GP	28.8	PCT		28.8	PCT		28.8	PCT	
68	HP/GP	18.1	PCT		18.1	HTH PCT		18.1	PCT	
70	HP/GP	6.6	HSL PCT		6.6	HSL/HTH PCT		6.6	HSL PCT	

UNIT	FUELS TRMT	Alt 2 acres	Alt2 RX	Alt2 Nat. Fuels	Alt 3 acres	Alt3 RX	Alt3 Nat. Fuels	Alt 4 acres	Alt4 RX	Alt 4 Nat. Fuels
71	HP/GP	21.4	HTH PCT							
72	HP/GP	44.4	HTH PCT		46.6	HTH PCT		42.8	HTH PCT	
73	HP/GP	29.5	PCT		29.5	PCT		29.5	PCT	
75	HP/GP	28.3	HTH PCT		28.3	HTH PCT		28.3	HTH PCT	
76	HP/GP	4.3	HTH PCT							
77	HP/GP	52.5	PCT		52.5	HTH PCT		48.5	PCT	
79	HP/GP	11.8	HTH PCT		11.8	HTH PCT		11.8	HTH PCT	
80	HP/GP	96.3	MDW		96.3	MDW		96.3	MDW	
81	HP/GP	18.8	PCT		18.8	PCT		18.8	PCT	
84	HP/GP	58.2	PCT		58.2	PCT		58.2	PCT	
85	HP/GP	14	HTH PCT		14	HTH PCT		14	HTH PCT	
86	HP/GP	17.7	PCT		17.7	PCT		17.7	PCT	
87	HP/GP	10.7		PRUNE	10.7		PRUNE	10.7		PRUNE
88	HP/GP	72.6	MDW		72.6	MDW		72.6	MDW	
89	HP/GP	103.2			103.2			103.2		
90	HP/GP	121.8	PCT		121.8	HTH PCT		121.8	PCT	
91	HP/GP	15.7	PCT		15.7	PCT		15.7	PCT	

UNIT	FUELS TRMT	Alt 2 acres	Alt2 RX	Alt2 Nat. Fuels	Alt 3 acres	Alt3 RX	Alt3 Nat. Fuels	Alt 4 acres	Alt4 RX	Alt 4 Nat. Fuels
92	HP/GP	29.7	HTH PCT		29.7	HTH PCT		29.7	PCT	
100	HP/GP	5.9	PCT		5.9	HTH PCT		5.9	PCT	
101	HP/GP	7.6	PCT		7.6	HTH PCT		7.6	PCT	
102	HP/GP	5.9	PCT		5.9	HTH PCT		5.9	PCT	

Appendix B

Unit-Specific Soils Effects by Alternative

Table B-1 Alternative 2

Ea Unit Number	Unit Acres	Proposed Treatment	Existing Detrimental Soil Conditions	Estimated Detrimental Soil Disturbance After Treatment Percent	Estimated Detrimental Soil Conditions AfterRestoration (Percent)	(Subsoil Acres)
2	102	HTH/HSV, PCT, HP	11.5 %	18.55 %	18.5 %	0
6	68	PCT, P	4 %	14 %	14 %	0
7	239	PCT, P, PP	.5 %	10.5 %	10.5 %	0
10	128	HTH, PCT,P	2.7 %	17.7 %	17.7 %	0
12	139	PCT, P	0 %	10 %	10 %	0
14	17	PCT, P	0 %	10 %	10 %	0
15	12	PCT, P	29 %	39 %	29 %	1.2
17	4	PCT, HP	29 %	29 %	29 %	0
18	63	PP, PCT, P	10 %	25 %	20 %	3
19	138	PCT, P	0 %	10 %	10 %	0
20	73	PCT, P, HP	0 %	10 %	10 %	0
21	81	PCT, P	0 %	10 %	10 %	0
22	30	PCT, HP	0 %	0 %	0 %	0
23	53	PCT, HP	29 %	29 %	29 %	0
25	15	PP, PCT,HP	0 %	10 %	10 %	0
26	33	PCT, P	29 %	39 %	29 %	3.3
27	22	PCT, P	0 %	10 %	10 %	0
28	245	PCT, CHIP, P	0 %	10 %	10 %	0
29	11	PCT, P	29 %	39 %	18 %	2
30	36	HTH, PCT, P	0 %	15 %	15 %	0
31	32	PCT, HP	29 %	29 %	29 %	0
32	87	PCT, HP	0 %	0 %	0 %	0
33	171	HTH	0 %	7 %	7 %	0
34	36	PCT, P	5.6 %	9.2 %	9.2 %	0
35	22	PCT, P	29 %	39 %	29 %	2.2
36	16	PCT, P	29 %	39 %	29 %	1.6
37	12	PCT, P	29 %	39 %	29 %	1.2
38	61	HTH, PCT, P	0 %	15 %	15 %	0
39	4	PP, PCT, P	0 %	15 %	15 %	0
40	18	PCT, P	29 %	39 %	29 %	1.8
41	231	HTH, PCT, P	0 %	15 %	15 %	0
42	74	PP, PCT, P	29 %	44 %	29 %	11
43	44	PCT, P	0 21.8 %	31.8 %	21.8 %	4.4
45	50	HTH, PCT, P	0 %	15 %	15 %	0
46	20	PCT, P	29 %	39 %	29 %	2
47	12	PCT, P	29 %	39 %	29 %	1.2

Ea Unit Number	Unit Acres	Proposed Treatment	Existing Detrimental Soil Conditions	Estimated Detrimental Soil Disturbance After Treatment Percent	Estimated Detrimental Soil Conditions AfterRestoration (Percent)	(Subsoil Acres)
49	121	HTH, PCT, P	0 %	15 %	15 %	0
51	6	PCT, P	29. %	39 %	16.7%	1
52	17	PP, PCT P	0 %	15 %	15 %	0
55	44	HTH, PCT, P	17 %	32 %	19 %	6
56	53	PCT, P	0 %	10 %	10 %	0
57	18	PCT, P	29 %	39 %	29 %	1.8
58	4	PCT, P	0 %	10 %	10 %	0
60	10	PCT, P	0 %	10 %	10 %	0
61	114	PCT, P	21 %	31 %	20 %	12.4
62	35	HTH, PCT, HP	13 %	20 %	20 %	0
64	36	HTH, PCT, P	.8 %	15.8 %	15.8 %	0
66	22	HTH, PCT. HP	0 %	7 %	7 %	0
67	29	PCT, P	0 %	10 %	10 %	0
68	18	PCT, P	0 %	10 %	10 %	0
70	7	HSL	0 %	7 %	7 %	0
71	21	HTH, PCT, P	0 %	15 %	15 %	0
72	47	HTH, PCT, P, PP	7.4%	22.4 %	20 %	1
73	30	PCT, P	29 %	39 %	29 %	3
75	28	HTH, PCT, P	0 %	15 %	15 %	0
76	4	HTH, PCT, P	0 %	15 %	15 %	0
78	33	HTH, PCT, HP	0 %	7 %	7 %	0
79	70	HTH, PCT, P	0 %	15 %	15 %	0
80	96	PCT, P	0 %	10 %	10 %	0
81	19	PCT, P	29 %	39 %	29 %	2
84	58	PCT, P	0 %	10 %	10 %	0
85	5	HTH, PCT, P	0 %	15 %	15 %	0
86	18	PCT, HP	29 %	29 %	29 %	0
87	11	HP	29 %	29 %	29 %	0
88	72	PCT, HP, PP	0 %	10 %	10 %	0
89	103	P	0 %	10 %	10 %	0
90	122	PCT, P	0 %	10 %	10 %	0
91	16	PCT, P	0 %	10 %	10 %	0
92	30	PCT, P	0 %	10 %	10 %	0
100	6	PP, PCT, P	0 %	10 %	10 %	0
101	8	PCT, HP	15 %	15 %	15 %	0
TOTAL	3551					66.95

Table B-2 Alternative 3

EA Unit	Unit Acres	Proposed Treatment	Existing Detrimental Soil Conditions	Estimated Detrimental Soil Disturbance After Treatment Percent	Estimated Detrimental Soil Conditions After Treatment (Percent)	(Acres)
2	102	HTH/HSV, PCT, HP	11.5 %	18.5 %	18.5%	0
6	68	HTH, PCT, P	4 %	19 %	19 %	0
7	239	HTH/HSV * PCT, P	.5 %	15.5 %	15.5 %	0
10	128	HTH, PCT,P	2.7 %	17.8 %	17.8%	0
12	139	HTH/HSV, PCT, P	0 %	10 %	10 %	0
14	17	PCT, P	0 %	10 %	10 %	0
15	12	PCT, P	29 %	39 %	29 %	1.2
17	4	PCT, HP	29 %	29 %	29 %	0
18	63	HTH, PP, PCT, P	10 %	25 %	20 %	3.0
19	138	PCT, P	0 %	10 %	10 %	0
20	73	HTH, PCT, P, HP	0 %	15 %	15 %	0
21	81	HTH, PCT, P	0 %	15 %	15 %	0
22	30	HTH, PCT, HP	0 %	7 %	7 %	0
23	53	PCT, HP	29 %	29 %	29 %	0
25	15	PP, PCT,HP	0 %	10 %	10 %	0
26	33	HTH, PCT, P	29 %	44 %	29 %	5
27	22	FW, PCT, P	0 %	10 %	10 %	0
28	245	HTH, PCT, CHIP,P	0 %	15 %	15 %	0
29	11	PCT, P	29 %	39 %	18 %	2
30	36	HTH, PCT, P	0 %	7 %	7 %	0
31	32	PCT, HP	29 %	29 %	29 %	0
32	87	HTH, PCT, HP	0 %	7 %	7 %	0
33	171	HTH	0 %	7 %	7 %	0
34	36	HTH, PCT, P	5.6 %	9.2 %	9.2 %	0
35	22	PCT, P	29 %	39 %	29 %	2.2
36	16	HTH, PCT, P	29 %	44 %	29 %	2.4
37	12	PCT, P	29 %	39 %	29 %	1.2
38	61	HTH, PCT, P	0 %	15 %	15 %	0
39	4	HTH, PP, PCT, P	0 %	15 %	15 %	0
40	18	PCT, P	29 %	39 %	29 %	1.8
41	231	HTH, PCT, P	0 %	15 %	15 %	0
42	74	HTH, PP, PCT, P	29 %	44 %	29 %	11
43	44	HTH, PCT, P	0 21.8 %	36.8 %	21.8 %	6.6
45	50	HTH, PCT, P	0 %	15 %	15 %	0
46	20	PCT, P	29 %	39 %	29 %	2
47	12	PCT, P	29 %	39 %	29 %	1.2

EA Unit	Unit Acres	Proposed Treatment	Existing Detrimental Soil Conditions	Estimated Detrimental Soil Disturbance After Treatment Percent	Estimated Detrimental Soil Conditions After Treatment (Percent)	(Acres)
49	121	HTH, PCT, P	0 %	15 %	15 %	0
51	6	PCT, P	29. %	39 %	16.7%	1
52	17	HTH, PP, PCT, P	0 %	15 %	15 %	0
55	44	HTH, PCT, P	17 %	32 %	17 %	6.6
56	53	HTH, PCT, P	0 %	15 %	15 %	0
57	18	PCT, P	29 %	39 %	29 %	1.8
58	4	HTH, PCT, P	0 %	15 %	15 %	0
60	10	PCT, P	0 %	10 %	10 %	0
61	114	PCT, P	21 %	31 %	43 %	11.4
62	35	HTH, PCT, HP	13 %	20 %	20 %	0
64	36	HTH, PCT, P	.8 %	15.8 %	15.8 %	0
66	22	HTH, PCT. HP	0 %	7 %	7 %	0
67	29	PCT, P	0 %	15 %	15 %	0
68	18	HTH, PCT, P	0 %	10 %	10 %	0
70	7	HSL/HTH	0 %	7 %	7 %	0
71	21	HTH, PCT, P	0 %	15 %	15 %	0
72	47	HTH, PCT, P	7.4%	22.4 %	20 %	1
73	30	PCT, P	29 %	39 %	29 %	3
75	28	HTH, PCT, P	0 %	15 %	15 %	0
76	4	HTH, PCT, P	0 %	15 %	15 %	0
78	33	HTH, PCT, HP	0 %	7 %	7 %	0
79	70	HTH, PCT, P	0 %	15 %	15 %	0
80	96	PCT, P	0 %	10 %	10 %	0
81	19	PCT, P	29 %	39 %	29 %	2
84	58	PCT, P	0 %	10 %	10 %	0
85	5	HTH, PCT, P	0 %	15 %	15 %	0
86	18	PCT, HP	29 %	29 %	29 %	0
87	11	HP	29 %	29 %	29 %	0
88	72	HTH, PCT, HP, PP	0 %	10 %	10 %	0
89	103	P	0 %	10 %	10 %	0
90	122	HTH, PCT, P	0 %	15 %	15 %	0
91	16	PCT, P	0 %	10 %	10 %	0
92	30	HTH, PCT, P	0 %	15 %	15 %	0
100	6	HTH, PP, PCT, P	0 %	15 %	10 %	0
101	8	HTH, PCT, HP	15 %	22 %	20 %	1

Table B-3 Alternative 4

Ea Unit Number	Unit Acres	Proposed Treatment	Existing Detrimental Soil Conditions	Estimated Detrimental Soil Disturbance After Treatment Percent	Estimated Detrimental Soil Conditions After Treatment (Percent)	(Acres)
2	59	HTH/HSV, PCT, HP	17 %	25 %	20 %	5
6	58	PCT, P	17 %	17 %	17 %	0
7	239	PCT, P	.5 %	.5 %	.5 %	0
8	18	PCT, P	29 %	29 %	29 %	0
9	11	PCT, P	29 %	29 %	29 %	0
10	128	HTH, PCT,P	2.8 %	9.8 %	2.8%	0
12	139	, PCT, P	0 %	10 %	10 %	0
14	17	PCT, P	0 %	10 %	10 %	0
15	12	PCT, P	29 %	29 %	29 %	0
17	4	PCT, HP	29 %	29 %	29 %	0
18	63	PP, PCT, P	10 %	15 %	15 %	0
19	138	PCT, P	0 %	10 %	10 %	0
20	73	PCT, P, HP	0 %	10 %	10 %	0
21	0	PCT, P	0 %	10 %	10 %	0
22	30	PCT, HP	0 %	0 %	0 %	0
23	53	PCT, HP	29 %	29 %	29 %	0
25	15	PP, PCT,HP	10 %	10 %	10 %	0
26	33	PCT, P	29 %	39 %	29 %	3.3
27	22	PCT, P	0 %	10 %	10 %	0
28	245	PCT, CHIP,P	0 %	10 %	10 %	0
29	11	PCT, P	29 %	39 %	18 %	2
30	36	HTH, PCT, P	0 %	7 %	7 %	0
31	32	PCT, HP	29 %	29 %	29 %	0
32	19	PCT, HP	0 %	0 %	0 %	0
33	171	HTH	0 %	7 %	7 %	0
34	36	PCT, P	5.6 %	9.2 %	9.2 %	0
35	22	PCT, P	29 %	39 %	29 %	2.2
36	16	PCT, P	29 %	39 %	29 %	1.6
37	12	PCT, P	29 %	39 %	29 %	1.2
38	61	HTH, PCT, P	0 %	15 %	15 %	0
39	4	PP, PCT, P	0 %	15 %	15 %	0
40	18	PCT, P	29 %	39 %	29 %	1.8
41	231	HTH, PCT, P				
42	74	PP, PCT, P	29 %	39 %	29 %	7.4
43	12	PCT, P	0 21.8 %	31.8 %	21.8 %	4.4
45	50	HTH, PCT, P	0 %	15 %	15 %	0
46	20	PCT, P	29 %	39 %	29 %	2

Ea Unit Number	Unit Acres	Proposed Treatment	Existing Detrimental Soil Conditions	Estimated Detrimental Soil Disturbance After Treatment Percent	Estimated Detrimental Soil Conditions After Treatment (Percent)	(Acres)
47	12	PCT, P	29 %	39 %	29 %	1.2
49	121	HTH, PCT, P	0 %	15 %	15 %	0
51	6	PCT, P	29. %	39 %	16.7%	1
52	17	PP, PCT, P	0 %	10 %	10 %	0
55	25	HTH, PCT, P	17 %	32 %	17 %	6.6
56	53	PCT, P	0 %	10 %	10 %	0
57	18	PCT, P	29 %	39 %	29 %	1.8
58	0	PCT, P	0 %	10 %	10 %	0
60	10	PCT, P	0 %	10 %	10 %	0
61	114	PCT, P	43 %	53 %	43 %	11.4
62	9	HTH, PCT, HP	23 %	38 %	23 %	5.25
63	16	PCT	29 %	29 %	29 %	0
64	36	HTH, PCT, P	.8 %	15.8 %	15.8 %	0
65	28	PCT, P	29 %	39 %	29 %	2.8
66	0	HTH, PCT. HP	0 %	7 %	7 %	0
67	29	PCT, P	0 %	10 %	10 %	0
68	18	PCT, P	0 %	10 %	10 %	0
70	7	HSL	0 %	7 %	7 %	0
71	0					
72	42	HTH, PCT, P	7.4%	22.4 %	20 %	1
73	30	PCT, P	29 %	39 %	29 %	3
75	28	HTH, PCT, P	0 %	15 %	15 %	0
76	0	HTH, PCT, P	0 %	15 %	15 %	0
77	48	PCT, P	0 %	10 %	10 %	0
78	0	HTH, PCT, HP	0 %	7 %	7 %	0
79	70	HTH, PCT, P	0 %	15 %	15 %	0
80	96	PCT, P	0 %	10 %	10 %	0
81	19	PCT, P	29 %	39 %	29 %	2
84	58	PCT, P	0 %	10 %	10 %	0
85	5	HTH, PCT, P	0 %	15 %	15 %	0
86	18	PCT, HP	29 %	29 %	29 %	0
87	11	HP	29 %	29 %	29 %	0
88	72	PCT, HP, PP	0 %	10 %	10 %	0
89	103	P	0 %	10 %	10 %	0
90	122	PCT, P	0 %	10 %	10 %	0
91	16	PCT, P	0 %	10 %	10 %	0
92	30	PCT, P	0 %	10 %	10 %	0
100	6	PP, PCT, P	0 %	15 %	10 %	0
101	8	PCT, HP	15 %	15 %	15 %	0

The following Best Management Practices will be implemented to control erosion from roads within the project area. A complete explanation of BMPs is found in *General Water Quality Best Management Practices* (USDA, 1988) and is available at the District Office or Supervisors Office.

Riparian Areas/ Wetlands, Streamside Management Units and Floodplains

RP-1 Riparian areas will be managed in the context of the environment in which they are located.

RP-2 Maintain or enhance riparian areas and the riparian dependent resources (water quality and quantity and vegetation that own there existence to riparian areas) associated with these areas.

RP-6 Manage water temperature to support benefiting resources. Evaluate the effects of proposed projects on water temperature and make adjustments where impacts to benefiting resources are predicted.

Rp-7 Meet or exceed water quality standards for the Sate of Oregon (Oregon Administration Rules Chapter 340-41) through the application of BMPs.

RP-8 Evaluate the cumulative effects of proposed project on water quality, runoff, and fish habitat and adopt measures to avoid adverse effects to these resources.

Water Quality

WT-1 State requirements will be followed in accordance with the Clean Water Act for protection of the waters of the State of Oregon (Oregon Administrative Rules, Chapter 340-41) through planning, application, and monitoring of Best Management Practices (BMPs) in conformance with the Clean Water Act, regulations, and federal guidance issued thereto.

WT-2 In cooperation with the State of Oregon, the forest will use the following process:

1. Select and design BMPs base on site-specific conditions, technical, economic and institutions feasible, and the water quality standards for those waters potentially impacted.
2. Implement and enforce BMPs
3. Monitor and ensure that practices are correctly applied as design.
4. Monitor to determine the effectiveness of practices in meeting design expectations and in attaining water quality Standards.
5. Evaluate monitoring results and mitigate where necessary to minimize impacts from activities where BMPs do not perform as expected.
6. Adjust BMPs design standard and application when it is found that beneficial use are not being protected and water quality standards are not being achieved to the desire level.

Soils

The Deschutes National Forest is to maintain or enhance soil productivity.

SL-1 Management activities will be prescribed to promote maintenance or enhancement of soil productivity. The potential for soil detrimental damages will be specifically addressed through project environmental analysis.

SL-3 Leave a minimum of 80 % of an activity area in a condition of acceptable productivity potential for trees and other management vegetation following land management activities. Include all systems roads, landings, spur roads, and skid roads or trails to evaluate impacts.

SL-4 any site where this direction cannot be met will require rehabilitation. Measures may include tillage, smoothing, fertilizing ore spreading of biological rich organics materials.

Timber Harvest Best Management Practices:

T-2 Title: Timber Harvest Unit Design

Objective: To ensure that timber harvest unit design will create favorable conditions of water flow, water quality, and fish habitat.

- Riparian Reserves are excluded for commercial harvest.
- No fuels treatment within 0-30 feet of the stream bank.
- Fuel treatment of 0-4 inches tree diameter.

T-3 Title: Use of Erosion Potentials Assessment for Timber Harvest Design.

Objective: To prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.

T-4 Title: Use of Sale Area Maps for Designating Water Quality Protection Needs.

Objectives: To delineate location of protection areas and available water sources as a guide for both the Purchaser and the Sale Administration.

- Designated water pump chance on map for water withdrawal.

T-7 Title: Streamside Management Unit Designation

Objective: To designate a riparian area or zone along streams and wetlands where prescriptions are made that will minimize potential effects from logging and related land disturbance activities on water quality and beneficial uses.

- No commercial harvest inside Streamside Management Unit Designation (riparian reserve) 300 feet on perennial, fish bearing stream and 150 feet on intermittent, non fish bearing streams.

T-8 Title: Stream Course Protection

Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow and (3) to prevent sediment and pollutants from entering streams.

- No commercial harvest inside Streamside Management Unit Designation (riparian reserve) 300 feet on perennial, fish bearing stream and 150 feet on intermittent, non fish bearing streams.
-

T-10 Title: Log Landing Location.

Objective: To located landings in such a way as to minimize creation of hazardous watershed condition.

- No landings will be located inside riparian reserves.

T-12.Title: Suspended Log Yarding in Timber Harvest.

Objective: 1. To protect soils from excessive disturbance, and
2. Maintain the integrity of the RRA's and other sensitive areas.

- One end suspension is required over entire unit.
- Full suspension is required over stream channel and wet areas.

T-13. Title: Erosion Prevention and Control Measures During Timber Sale Operations.
Objective: To ensure the Purchaser's operations shall be conducted to minimize soil erosion.

- Filter Fencing may be needed in roadside ditches if operating during rainy season. Consult with District Hydrologist.

T-18 Title: Erosion Control Structure Maintenance.

Objective: To ensure that the constructed erosion control structures are stabilized and working.

- Consult with District Hydrologist.

Road System Best Management Practices:

R-1 Title: Guidelines for the Location and Design of Roads.

Objective: To located and design roads with minimal resource damage.

- If roads are constructed adjacent to or inside riparian reserves consult District Hydrologist.

R-2 Title: Erosion Control Plan

Objective: To limit and mitigate erosion and sedimentation through effective planning prior to initiation of road constructions activities and through effective contract administration during construction.

R-3 Title: Timing of Construction Activities.

Objection: To minimize erosion by conducting road construction operation during minimal runoff periods.

- It is recommended that road maintenance or road construction be completed in the dry season. Consult District Hydrologist.

R-6 Title: Dispersion of Subsurface Drainage Associated with Roads.

Objective: To minimize the possibilities of roadbed and cut or fill slope failure and subsequent production of sediment:

- Consult District Hydrologist.

R-9 Title: Timely Erosion Control Measures on Uncompleted Roads and Stream Crossing.

Objective: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

- Filter fencing may be required during construction.

R-13 Title: Diversion of Flow Around Construction Sites

Objective: (1) To ensure all stream diversion are carefully planned, (2) to minimize downstream sedimentation, (3) to restore stream channels to their natural grade, condition, and alignment as soon as possible.

- Consult District Hydrologist.

R-14 Title: Bridge and Culvert Installation and Protection of Fisheries.

Objective: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

- Types of sediment barriers may have to be installed. Consult District Hydrologist.

R-18 Title: Maintenance of Roads.

Objective: To maintain roads in a manner which provides for water quality protection by controlling the placement of waste material, keeping drainage facilities open, and by repairing ruts and failures to reduce sedimentation and erosion.

- Consult District Hydrologist.

Prescribe Fire Best Management Practices

F-2 Title: Consideration of Water Quality in Formulating Prescribed Fire Prescriptions.

Objective: To provide for water quality protection while achieving the management objectives through the use of prescribed fire.

- Consult District Hydrologist.

F-3 Title: Protection of Water Quality During Prescribed Fire Operations.

Objectives: To maintain soil productivity

- Spring or late fall burns are desired.

Appendix C

Use of the DecAid Tool

Woodpecker Guild and the Use of the DecAid Tool
Crescent Lake WUI, March 2004

The woodpecker guild was selected as management indicator species (MIS) because of their association with snags for nesting, roosting, and foraging habitat. On the Deschutes National Forest 10 species of woodpeckers excavate cavities that are used by 33 other species of hole-nesters incapable of excavating their own cavities. The woodpecker species guild selected as MIS includes the black-backed, white-headed, hairy, Lewis, pileated, and three toed woodpeckers plus the northern flicker and Williamson sapsucker.

In 2002 an advisory tool was developed (DecAid, Marcot et al.) that synthesized published research data on wildlife and forest inventory data and professional knowledge of fungi, insects, and pathogens. DecAid presents information on wildlife use of snag diameters, snag density, down wood diameter, and down wood percent cover. The information is provided from studies conducted on unharvested forested stands in addition to those where management has occurred. While DecAid provides data on wildlife use of snags and down wood it does not measure the biological potential of wildlife populations. The habitat condition types described in DecAid are derived from the ten forested wildlife habitat types listed in the Wildlife Habitat Relationships Project (Johnson and O'Neil 2001). Three of the ten habitat types are present in the Crescent Lake WUI including the Eastside Mixed Conifer (Blue Mtns.), Ponderosa Pine/Douglas-fir, and Lodgepole Pine. At the present time there is no summarized data on wildlife use of the lodgepole pine forest type.

The DecAid advisory tool was reviewed for its potential use in relation to the Crescent Lake Wildland Urban Interface project. While the WUI project does not specifically target snags for removal, some incidental snag felling may occur during temporary road construction and/or where log decks and landings may be placed during harvest operations. There is no regeneration timber harvest proposed with this project. The stated project objective is to reduce the fire risk to wildland urban interface areas by reducing ground fuels and understory conifers trees that can act as ladder fuels if a wildfire were to start. However, DecAid was still reviewed for published and synthesized information on snag use by the woodpecker guild species found on the Deschutes National Forest. The following tables and discussion show what data is available on snag diameters and densities per acre by species by habitat type. Tables have also been prepared to show what range of densities per acre by size class by forest type may be currently present in the WUI. This data was collected from cruise plot data taken from several project timber sale units that are within the boundaries of the WUI. The Royal sale was commercially thinned in 2003 and the Critter sale has been sold and awarded but has not been commercially thinned at this time but may occur in 2004.

One element of the DecAid tool is the use of three assigned tolerance levels (30, 50, or 80 percent) for each forest habitat type. The tolerance level is used to describe the percent of the species studied that used a particular habitat component such as snag diameter or snag density per acre, i.e. 30 percent of a woodpecker species population studied used snags for nesting that were greater than a certain diameter. A tolerance level has also been assigned to each forest type or subtype based on the likely potential of the land to support various densities of snags based on considerations for fire and the capability to grow trees in given tolerance levels. Generally, the higher tolerance level is assigned to habitat types that are moist and have low fire frequency regimes and/or are on drier sites such as north aspects with moderate slopes. The 30 and 50 percent tolerance levels are used on drier sites with moderate or frequent fire regimes. The information provided at the three tolerance levels may be interpreted as three levels of assurance with low representing (30%), moderate (50%), and high (80%) level.

The DecAid advisory tool also breaks each forest habitat type into small/mid-structure stands and late-structure stands. In some tables the data for small/medium trees and larger trees are identical if the data was collected in both structural condition classes. The following table displays the current forested condition on national forest lands in the Crescent Lake WUI broken down by forest type and size class.

Table C-1. Acres of National Forest Lands in the Crescent Lake WUI by Forest Type and Size Class

Forest Type	Small and Mid-Structure	Late-Structure
Lodgepole Pine	4,798 acres	638 acres
Ponderosa Pine/Douglas-Fir	279 acres	0 acres
Mixed Conifer	3,221 acres	181 acres
Grand Total Acres	8,298 acres	819 acres

Because the majority of the national forest acreage within the Crescent Lake WUI is mid-successional sized lodgepole pine, mixed conifer and ponderosa pine, the following discussions in DecAid reference the data collected in studies where small-medium tree sizes were present.

The following table displays estimated snag densities by diameter class that were compiled in several proposed harvest units within the Crescent Lake WUI planning area. These stands were analyzed in the Baja 58 and Seven Buttes environmental assessments. The data was collected by district pre-sale personnel while timber cruising the proposed units prior to timber sale auction and harvest. The table is intended to show what range of snag densities may be present within proposed treatment areas of mixed conifer and ponderosa pine/Douglas-fir stands of the WUI.

Table C-2. Estimated Snag Densities Within Several Proposed Timber Sale Harvest Units Within The Crescent Lake WUI (data taken from cruise plots).

East-Side Mixed Conifer		**East-Side Ponderosa Pine/Douglas-Fir**	
Royal Sale Unit #49		**Royal Sale Unit #50**	
Snag Diameter	Snags/Acre	Snag Diameter	Snags/Acre
12-19.9 inches	4.19/acre	12-19.9 inches	1.60/acre
20-29.9 inches	0.50/acre	20-29.9 inches	0.11/acre
> 30.0 inches	0.50/acre	> 30.0 inches	0.01/acre
Total > 12.0 inches	5.16/acre	Total > 12.0 inches	1.80/acre
East-Side Mixed Conifer		**East-Side Mixed Conifer**	
Critter Sale Unit #51		**Critter Sale Unit #81**	
Snag Diameter	Snags/Acre	Snag Diameter	Snags/Acre
12-19.9 inches	7.00/acre	12-19.9 inches	3.30/acre
20-29.9 inches	0.58/acre	20-29.9 inches	0.18/acre
> 30.0 inches	0.58/acre	> 30.0 inches	0.21/acre
Total > 12.0 inches	8.25/acre	Total > 12.0 inches	3.70/acre

The above table shows estimated snag densities within several timber sale units that were thinned in 2003 (Royal sale) or will be commercially thinned in 2004. The table is intended to show the range of snag densities by diameter class that may be present in representative harvest units within the Crescent Lake WUI project. One of the most striking elements noted is the scarcity of snags greater than 20 inches in diameter. This may be the result of smaller diameter stands lacking a large tree component, lack of large diameter trees that have experienced mortality, or old salvage harvests that removed snags with sound wood. Because snag data was only collected on snags greater than 12 inches diameter, the snag density per acre may be substantially higher if data had been collected on snags 10 inches diameter and greater comparable to the data present within the DecAid synthesis.

The following table displays the average snag diameter used by cavity excavator species by tolerance level and forest habitat type taken from DecAid.

Table C-3. Synthesized Data For Wildlife Use of Snag Diameters For Nesting Purposes By Forest Type, Structure Size and Tolerance Level From DecAid Synthesis.

East-Side Mixed Conifer Small-Medium Tree Size Structure *			**Ponderosa Pine/Douglas-Fir Small-Medium Tree Size Structure ***		
Species	30% Tolerance	50% Tolerance	Species	30% Tolerance	50% Tolerance
BBWO	8.4 inches	12.1 inches	BBWO	6.7 inches	14.4 inches
HAWO	10.5 inches	16.3 inches	HAWO	10.3 inches	16.4 inches
NOFL	17.7 inches	22.2 inches	NOFL	17.2 inches	21.8 inches
PIWO	25.1 inches	29.2 inches	PIWO	26.0 inches	29.6 inches
TTWO	8.8 inches	10.8 inches	TTWO	No Data	
WHWO	20.4 inches	26.3 inches	WHWO	20.4 inches	26.2 inches
WISA	20.6 inches	27.5 inches	WISA	20.3 inches	27.3 inches
* Data is the same for Large Tree Size Class					

BBWO = Black-backed woodpecker
HAWO = Hairy woodpecker
NOFL = Northern flicker
PIWO = Pileated woodpecker
TTWO = Three-toed woodpecker
WHWO = White-headed woodpecker
WISA = Williamson sapsucker

Interpreting Table C-3 indicates that 30 percent of the nesting black-backed woodpecker population can be accommodated with snags of 8.4 inches but 50 percent of the population could be accommodated if the snag diameter is increased to 12.1 inches for the east-side mixed conifer habitat type. The correlation would be similar for the other species and forest type.

In reviewing Tables C-2 and C-3 currently there is little habitat present to support species with large diameter snag requirements such as the pileated woodpecker, Williamson sapsucker, northern flicker, and white-headed woodpecker because large snags are very limited based on field reconnaissance and cruise plot data. However, for the other species that can utilize snag diameters less than 20 inches, they could accommodated at the 30 and 50 percent tolerance level based on diameters used.

Table C-4. Snag Diameter and Snag Density Per Acre To Support Nesting or Denning of Selected Wildlife Species at the 30 Percent, 50 Percent, and 80 Percent Tolerance Level as Available From DecAid Advisory Tool.

East-Side Mixed Conifer Small-Medium Tree Size Structure				**Ponderosa Pine/Douglas-Fir Small-Medium Tree Size Structure**			
Species	Snag Diameter	Tolerance Level	Snags/Acre	Species	Snag Diameter	Tolerance Level	Snags/Acre
PIWO	> 9.8 in.	30%	No Data	PIWO	> 9.8 in.	30%	No Data
PIWO	> 19.8 in.	30%	No Data	PIWO	> 19.7 in.	30%	No Data
PIWO	> 9.8 in.	50%	30.40	PIWO	> 9.8 in.	50%	30.40
PIWO	> 19.7 in.	50%	7.32	PIWO	> 19.7 in.	50%	7.60
PIWO	> 9.8 in.	80%	No Data	PIWO	> 9.8 in.	80%	No Data
PIWO	>19.7 in.	80%	No Data	PIWO	> 19.7 in.	80%	No Data
WHWO	> 9.8 in.	30%	0.30	WHWO	> 9.8 in.	30%	0.30
WHWO	>19.7 in.	30%	0.00	WHWO	> 19.7 in.	30%	0.50
WHWO	> 9.8 in.	50%	1.90	WHWO	> 9.8 in.	50%	1.70
WHWO	>19.7 in.	50%	1.50	WHWO	> 19.7 in.	50%	1.80
WHWO	> 9.7 in.	80%	4.30	WHWO	> 9.8 in.	80%	3.70
WHWO	>19.7 in.	80%	3.80	WHWO	> 19.7 in.	80%	3.80
CNB	> 9.8 in.	50%	No Data	CNB	> 9.8 in.	50%	No Data
CNB	>19.7 in.	50%	2.4	CNB	>19.7 in.	50%	No Data
CNB	> 9.8 in.	80%	No Data	CNB	> 9.8 in.	80%	No Data

East-Side Mixed Conifer Small-Medium Tree Size Structure				Ponderosa Pine/Douglas-Fir Small-Medium Tree Size Structure			
Species	Snag Diameter	Tolerance Level	Snags/Acre	Species	Snag Diameter	Tolerance Level	Snags/Acre
CNB	>19.7 in.	80%	No Data	CNB	>19.7 in.	80%	No Data
AMMA	> 9.7 in.	30%	No Data	AMMA	> 9.7 in.	30%	No Data
AMMA	>19.7 in.	30%	No Data	AMMA	>19.7 in.	30%	No Data
AMMA	> 9.8 in.	50%	16.20	AMMA	> 9.8 in.	50%	No Data
AMMA	>19.7 in.	50%	5.00	AMMA	>19.7 in.	50%	No Data
AMMA	> 9.8 in.	80%	No Data	AMMA	> 9.8 in.	80%	No Data
AMMA	>19.7 in.	80%	No Data	AMMA	>19.7 in.	80%	No Data

PIWO = Pileated woodpecker WHWO = White-headed woodpecker
AMMA = American marten CNB = Cavity Nesting Birds

Interpreting the above table indicates for the two cavity excavator species with data available generally shows that increasing the snag diameter reduces the number of snags per acre needed to accommodate the same percentage of the population. The high numbers of snags per acre for the pileated woodpecker especially at the 50 percent tolerance level was data collected within nest sites. Attaining snag densities at this level within the Crescent Lake WUI may only possible in the moist mixed conifer sites. The only moist mixed conifer habitat present in the Crescent Lake WUI is located east of Crescent Lake in several narrow riparian areas, in the Refrigerator Creek drainage and limited acreage near Crescent Creek east of the lake. The only data available for cavity nesting birds in general shows that 2.4 snags/acre > than 19.7 in. would accommodate 50 percent of the population in the east-side mixed conifer habitat. There is no data for the 30 and 80 percent tolerance level nor for any tolerance level within the ponderosa pine/Douglas-fir stands. The data displayed in Table C-2 and compared to Table 3 also show that we are managing habitat for American marten at less than the 50 percent tolerance level based on cruise plot data taken on commercial thinning sales in the WUI.

Because there is limited data on snag densities DecAid suggested reviewing the inventory data collected on unharvested plots with measurable snags. Snag densities could be managed for these higher levels on some portions of the landscape especially in moister sites with a moderate or low fire severity regime. The following table displays the snag density numbers by plant association and tolerance level. However, it should also be noted that caution should be exercised while using data from unharvested plots in the Ponderosa pine-Douglas-fir habitat type. Due to decades of fire exclusion, current levels, composition, and distribution of decayed wood elements likely to not reflect historic or “natural” conditions, even in unharvested stands.

Table C-5. Inventory Data On Snag Densities Collected On Unharvested Plots With Measurable Snags

Tolerance Level	East-Side Mixed Conifer	Ponderosa Pine-Douglas-Fir
80 Percent	25/ac. >10” of which 8.5/ac. >19.7”	7.3/ac. >10” of which 2.5/ac. >19.7”
50 Percent	12.5/ac. >10” of which 4.2/ac. >19.7”	2.7/ac. >10” of which 1.1/ac. >19.7”
30 Percent	6.7/ac. >10” of which 2.7/ac. > 19.7”	1.3/ac. >10” of which 1.1/ac. >19.7”

Because the focus of the Crescent Lake WUI project is to reduce the risk of uncontrolled wildfire on urban interface lands maintaining snag densities described in Table 4 are unlikely unachievable and not warranted except within the moist or wetter sites. These conditions are limited within the WUI to several stream drainages.

Down Wood Management

Table C-6. High Density Down Wood Concentrations Described in DecAid From Data Collected Primarily From Unharvested Plots Expressed By Tolerance Level and Plant Association.

Tolerance Level	East-Side Mixed Conifer	Ponderosa Pine-Douglas-Fir
80 Percent	6 Percent > 14" diameter	3 Percent >14" diameter
50 Percent	3 Percent > 8-10" diameter	1.4 Percent > 10" diameter
30 Percent	2 Percent > 5-8" diameter	0.9 Percent > 8" diameter

Table C-6 above displays down wood levels based on the best available wildlife and inventory data and was collected primarily from unharvested plots with measurable down wood. Down wood concentrations at these levels are likely only possible on moist acreages with a moderate or high severity fire regime. The log diameters listed above are the minimums and DecAid acknowledged that larger diameter logs are important for many wildlife species including denning needs for black bear and marten. The greatest benefit would occur by maintaining a range of down log sizes distributed across the landscape.

The inventory data collected on down wood in unharvested plots also showed that 19 percent of the east-side mixed conifer and 35 percent of the ponderosa pine plots were devoid of all measurable down wood > 4.9" diameter. For large diameter down wood >19.7", 63 percent of the east-side mixed conifer plots and 78 percent of the ponderosa pine plots were also devoid of this diameter wood which shows down wood was not evenly distributed across the landscape.
The Davis LSR overlaps the very northern portion of the Crescent Lake WUI north of Crescent Lake Junction to Odell Lake. The DLSRA gave some recommendations on the amounts of down wood expressed in tons/acre be left for site productivity and wildlife needs. As an example, within the ponderosa pine dry PAG the recommended level is 10-15 tons/acre. Using data from DecAid (east-side ponderosa pine/Douglas-fir) this would equate to about 4.4 percent down wood ground cover. However, even this level of fuel loading may not be possible on every acre. Where possible, higher down wood percent ground cover will be left particularly within riparian zones and/or other concentrated sites that could be isolated by heavily treating the fuels surrounding these areas. Over the entire area, it may be possible to leave a range of 2-4 percent while still maintaining a reduced risk of wildfire in an urban interface situation.

Projected Future Management of Dead Wood in the Crescent Lake WUI

Because the Crescent Lake WUI project has been designed to reduce the risk of wildfire in the urban interface, maintaining high densities of snags and high accumulations of down wood evenly distributed across the WUI is not projected to occur. To maintain this reduced risk level periodic treatments would have be scheduled for fuels reduction work as often as every 1-2 decades or as needed. Consequently, managing for wildlife species habitat at the 80 percent tolerance level described in the DecAid synthesis is not going to occur on every acre nor does DecAid recommend managing every acre of habitat to this level. The synthesis does recommend managing some acreage at these higher levels for the benefit of wildlife where appropriate. Because repeated silvicultural and fuels treatments would occur on a regular basis, untreated blocks particularly within riparian zones may be the most logical place to maintain higher levels of snags and down wood accumulations.

The current vegetative condition of the WUI also places some limitation on the numbers and distribution of wildlife use in this area. Greater than 50 percent of the national forest acreage in the WUI is in the lodgepole pine PAG for which there is no data in DecAid currently available. The remaining acreage is primarily small and medium sized structure of east-side mixed conifer and a minor amount of ponderosa pine/Douglas-fir habitat type as described in DecAid. Some

large structure habitat of mixed conifer and Ponderosa pine/Douglas-fir is present south of Odell Lake and east of Crescent Lake. The pre-commercial and commercial thinning proposed would reduce stem densities within the affected stands and result in increased green tree growth. Over time this would also increase the diameters of snags that develop and the down logs that fall to the ground. Providing a wider range of snag diameters and down logs greater 20 inches in diameter would increase the value of these lands for wildlife use.

Over time we would expect to see an increase in habitat suitability for those species such as pygmy nuthatches, white-headed woodpeckers, and flammulated owls. These species are associated with large diameter ponderosa pine type habitat which would increase as stands are thinned and residual trees experience increased growth rates. Habitat would also continue be available for other cavity nesters than can utilize snag diameters less than 20 inches such as the black-backed woodpecker, northern flicker, hairy woodpecker and the three-toed woodpecker. Even though the Crescent Lake WUI project is focused on fuels reduction and forest health issues, a diverse array of wildlife habitat conditions would be sustained capable of maintaining wildlife populations in an urban interface fire environment.

Appendix D

Agencies, Individuals, and Groups that Received Scoping and Comment Period Notices

Scoping List, November 2002

Alliance of Forest Workers and Harvesters, Bradley Porterfield
American Forest Resources Council, Chuck Burley
Associated Oregon Loggers, Inc.
Bend/Ft. Rock Ranger District, David Frantz
Bohemia Sno-Sledders, Hal Heideman
Boise Cascade Corporation
Bonneville Power Administration, Libby Johnson
Bureau of Land Management, Division of Natural Resources
Burns Paiute Tribe, Beth Coahram
Central Oregon Fly Fishers, Ned Austin
Central Oregon Fly Fishers, Robert Speik
Central Point Lumber, Warren Hudspeth
Conf. Tribes of Warm Springs, Scott Stuemke
Confederated Tribes of the Warm, Robert Brunoe
Consolidated Pine, Elden Ward
Crescent Lake Lodge & Resort, Jason Wilson
Crescent-Odell RFPD
Deschutes National Forest, Susan Skakel
DR Johnson Lumber Co., Gerald Keck
Environmental Protection, Judith Leckrone Lee
Forest Action - Survival Center, U of O
Forest Conservation Council, John Talberth
Forestry Action Committee, Susan Chapp
Frontier Advertiser
Herald & News
Jefferson Center, Beverly Brown
Malheur Timber Operators, Inc. Ken Evans
KTVZ
Native Plant Society, Stu Garrett, M.D.
Northwest Environmental Defense Glenn Fullilove
Northwest Special Forest Association
NRDC, Travis Faircloth
Ochoco Lumber Company, Bruce Daucsavage
Ochoco Lumber Company, John Morgan
Odell Lake Association, Dean & Wanda Abbott
Odell Lake Homeowners, Steve Stewart
Odell Lake Lodge & Resort, Vince & Paulette Jesse
Oregon Dept. of Fish and Wildlife, Chip Dale
Oregon Dept. of Fish and Wildlife, Steve George
Oregon Dept. of Fish and Wildlife, Corey Heath
Oregon Dept. of Fish and Wildlife, Clair Kunkel
Oregon Dept. of Fish and Wildlife, Steve Marx
Oregon Dept. of Transportation, Gary Larson
Oregon Eagle Foundation
Oregon Hunters, Kelly Smith
Oregon Natural Resources, Doug Heiken
Oregon Natural Resources, Tim Lillebo
Oregon State Snowmobile Assn., Howard Gieger
Pacific West Community Forestry Center, Jonathon Kusel
Lisa Blanton
Quincy Library Group, Linda Blum
Sand Creek Logging, Linda Montgomery
Shelter Cove Resort, Jim & Trula Kielblock
Sisters Ranger District, Kris Martinson
The Bulletin, Rachel Odell
The Klamath Tribes, Allen Foreman
The Klamath Tribes, Willie Hatcher
The Nugget Newspaper, Eric Dolson
The Wilderness Society, Robert Freimark
Tribal Council of the Burns
Trout Unlimited, Tom Wolf
Union Pacific Railroad, Kevin Adams
Upper Deschutes Watershed, Ryan Houston
US Fish & Wildlife Service, Jeff Dillon
US Timberlands Services, Martin Lugus
USDA Forest Service SPS, Attn: Appeals
Walker Rim Riders
Dick & Joani Dufourd
Harry Farley
Kyle Gorman
George & Virginia Heldt
Rebecca McLain
Joni Mogstad
Bob Mullong
Vern Oden
Amphone Phonngam
Kao Saechao
Yan Saeteurn
Deng Sandara
Sothon S. Suy
Phet Thavisack
Roy Vermillion
Khamtan Vorasane

ADREON LONNA
ADREON MERLYN LEON & JOY M
AITKEN GREG EICHE & SARAH E
ALACANO LOUIE & DEANNA TRUSTEE &
ALBERTS DEVELOPMENT LLC
AMACHER THOMAS J & DAYNA LEE
AMERICAN CASH EQUITIES INC
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ANDERSON LESLIE P
ANDERSON MAURICE
ANDERSON VIRGIL L & EUNICE
ATR SERVICES INC
AUMULLER CALVIN &
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BAKER C A
BALZER LEE A &
BANNISTER KYLE OWEN
BARLEY HAROLD J & ALECE F
BARNES WALTER A
BARNETT WOODROW L & EULA L TRUSTEES
BAXTER SAMUEL R & SANDRA R
BECKER WILBUR M & PATRICIA
BECKLEY FRED C
BELVILL EVERETT E & SHARON D
BENEFIEL ARTHUR N & SYDNEY J
BENTZ KRISTEN LYNN

BERKE CLIFFORD W & SUE ANN
BERTLING T J
BIVENS JOYCE E
BLOOMER BEN A & ALICE
BOGIOS CHRIS G & BEVERLY A
BOLTON MARK C
BORTZ BEN M & PATRICIA L
BOSSE JACK
BOSTETER CLIFF R JR & MARGARET A
BOWERMAN MC'KENZIE D
BOYLES DURWARD L
BRADBURY JAMES D & PATRICIA G
BRASHNYK ANATOLE & JEANETTE
BREWER JEFF A & GAIL RUTH TRSTE &
BRIDGES WYVERT E & VERNA L
BRIERY RONALD D & SANDRA K
BRINKLEY JEFF & TRACY ANN
BROWN DOUGLAS D
BROWN HARRY M
BRUCKER MICHAEL & BARBARA
BURRITT DAVID R & MARYANN
BUSCH HAROLD H & JEANNE E
CANON DON & LUCINDA
CAPUTO FRANK
CARLSON DANIEL EDWARD
CARLSON RICHARD R & SALLY R
CARPENTER RICHARD T & DAWNETTE M
CHAMBERS SCOTT D
CHELGREN KARL W & EMILY J
CHRISTIANSON R CHRIS & DELORES
CICELSKE FRANCIS
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CLAYTON JAMES CLAUD TRUSTEE
COLE LARRY D & JUNE ANN
COLL ROBERT M
COLLINS JAMES C
COLLINS WAYNE & DEBBIE
CONCANNON KATHLEEN A
CONCANNON ROBERT P & LUCILLE M
COOK ROBERT M & CATHERINE
COOPER LARRY J TRUSTEE
CORNELIUS GRANT L
CRAIG PAUL M TRUSTEE
CRAIG STEVEN M & CHARLOTTE L
CRAMBLIT MICHAEL
CRAMBLIT TIM R & CYNTHIA A
CRAMER DANIEL J & SUSAN E
CRANE MARVIN L
CRANE RUSSELL W
CRESCENT CREEK PROPERTIES &
CRESCENT LAKE RESORT CO
CRESCENT ODELL LAKES RURAL
CRISP ALTON J &
CROSBY PATRICK ROSS
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DAIN TOM W & DARLENE K
DATZMAN MARYLIN
DAVIDSON CLIFFORD & DIANE
DAVIS BRIAN B
DAVIS GERALD DALE & SHARON K
DAVIS IOLA M TRUSTEE
DAVIS WILLIAM F
DEETS WILLIAM N & FRANCES M
DE'FOE CHARLES E
DEFOE CHARLES E JR
DE'GARLAIS GARTH R & CATHY
DEGRYSE RICHARD J TRUSTEE &
DEGULIS GARY & SUSAN
DEMEYER JOE G
DEYOE DONALD R & CONNIE L
DIAMOND MIKE
DOANE GERALD G & MARY V
DODD ROY JR & JUNE
DOVE RONALD E & NAN B
DOWNING BOB D & KATHRYN K
DUARTE ARTHUR S TRUSTEE
DUGDALE DONALD J & CONNIE L
DUKE LARRY D & LINDA L
DUNN FAMILY TRUST
DU'PUIS JOHN A
EASLEY JOHN III
EDWARDS CURTIS J & SHELLEY L
EGGELSTON RON
ELLER STERLING W & BETTY L
ELLINGTON DARRELL E & KERRY E
EMEHERSHER JAN D & KATHLEEN M
ENGLAND DONALD LEONARD
FINLEY HELEN M & TRACY L
FISHER DIANA J TRUSTEE
FITKIN THOMAS & MELINDA
FLOYD JAMES S & KATHERINE I
FRACHISEUR ROBERT L & JEAN A
FREDERICK JEFFREY J &
FULLER BRIAN R &
GAULT DAVID W & BARBARA J
GAUNTLETT JACK W
GEROT MICHAEL W & ELIZABETH
GIBBS W D & GLORIA S &
GILBERT RICHARD D & NANCY J
GISLER VINCENT &
GOETZKE FRED
GOETZKE FRED
GOEVELINGER NICKOLAS L & CAROL A
GOFF LLOYD W & SHEILA C
GOLDEN RICHARD T & PATRICIA M
GONCE RALPH JR & DIANA G
GRACE BILLY H
GRAHAM ROBERT L
GRECH LARRY
GROVES RANDALL B & MARY S
GROVES RION S
GUEST EDWARD E & JOANNE S
GUSTAFSON KENNETH & MARY L
GUSTIN RONALD L & TAMMY G
HAFFNER ROGER K & SALLY J
HALL TERRY L & CHY A
HAMMOND DEAN & SUSAN
HANSEN LEE J & WENDY L
HARDIE MARGARET C
HARRIS KENNETH N & MARY L
HARRIS KENNETH R & JEAN M
HAYNES STEVEN D & MELANY B
HAYNES WILLIAM A
HELDT GEORGE E & VIRGINIA L

HENDERSON F ERUGENE & HOLLY J TRTE &
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HOWELL ROBERT H & ELIZABETH
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IVERSON RAYMOND J & MERYLE I &
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JAMES ROBERT L & HELEN E
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JENNESS GORDON D TRUSTEE
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JONES CATHERINE S
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LOWERY MONTE J & KATHY L
LOWTHER DALE L & OLGA
LYNES JAMES E
MARTIN IDA MARGARET TRSTEE
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MARTIN TERRENCE A & SANDRA H
MASON WILLIAM J & CLARISSA
MATKOWSKI JOHN L & KIM R
MAXWELL FLOYD D
MAXWELL LLOYD W & BETTY L
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MC'CURDY LARRY K
MC'CUTCHAN ROBERT H & BONNIE J
MC'DONALD CHARLES & HELEN
MC'DONALD JOHN A & LILLA E
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MC'ENROE ROBERT & ELSIE LIV TRUST
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MENEFEE GEORGIA
MESSENGER CHARLES F & JANICE D
METZGER RODNEY C & ANNE C &
MICHEL JOHN F
MICKLE CHRISTOPHER D
MIFSUD FRANK D & CHRISTY E
MILLER DAVID E ETAL TRUSTEES &
MILLER H R FAMILY TRUST &
MILLER MICHAEL P
MINOR OMA TRUSTEE
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MONFORT D KEITH & MARGARET S
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MURPHY RILEY C & JENNIFER L
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NARO DAVID C & CHERIE A
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OLMSTED COLLIN ARCHIE
OLSON ARMEAD A TRUSTEE &
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OSBORNE DELMORE W & NANCY A
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PALMER JOHN K & JEAN M
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PEREZ JOHN P & CARLA J
PERKINS PEYTON & RUTH
PERSONS WAYNE B
PETERS ROBERT K & PENNY D
PETERSON JERRY LEONARD
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POPE SCOTT LELAND
POTTERF LORI K
POTTERF RANDAL L
POTTERF RICKIE A
POWELL RANDAL A & REBECCA S
PRENEVOST JOSEPH & DIANN L &
PRIAULX WILLIAM H & PATRICIA L
PRICE CHERRY LANETT
PRIGMORE GEORGE W III & ALICIA M
PYLOT BUILDERS INC
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REDDING RONALD F & SANDRA H
REEB DONALD

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REX GEORGE B & MELISSA R &
RHODES CHARLES J & ELAINE H
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RIGGS JAMES RANDALL
ROLL NORMAN & JO ANN
ROLLINS GLENN L
ROSE MARK D & M RAMONA
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RUSOW BRADLEY K
RUSSELL JERRY W
SANDERS LON A & VIVIAN L
SANFORD JAMES L JR & TRACY M
SAVKO GEORGE M & ANNA MARIE
SAWTELLE ROBERT L & GERALDINE D
SCHAFER RONALD SR & CHRISTY L
SCHARN PAUL W
SCHNEIDERHAN DANIEL A & KELLY J
SCHORI RICHARD M & KATHARINE JEFFERTS
SCHULZE DAVID A & BOBBIE R &
SCHUMACHER ROBERT M & SHERRY R &
SHEAR STEVEN L & KATHLEEN M
SHULTS JIM L & KATHRYN L
SIRAGUSA RICHARD D & KIMBERLY L
SLAUGHTER WILLIAM N & CLAUDIA S
SMITH CHARLES E & DONNA M
SMITH RUSSELL & DOLORES
SOUTHER BRADLEY A & ANN M
SPEER HOWARD E CO-TRUSTEE
SPENCE EDWARD D
SPERLE ROGER ALAN & KATHERINE ELIZABETH
SQUIRE KEITH & GEORGANN
STANGIER LISA L
STEVENS ANDY & CRISTIE
STOLL A J & MARJORIE G
STONE DOYCE W & WINIFRED O LIV TRUST
STREBE FRED E & NANCY J
STUMBAUGH DOUGLAS E & BILLIE J
SUTTON WILLIAM L & DEANNE &
SWAN JUDY IRENE
SWARTZ RAFE
SWEENEY WILLIAM P & JOYCE R
TASA TAPA LLC
TAYLOR KEITH W & BABETTE L
TAYLOR ROBERT E
TAYLOR ROBERT L & DIANE L
THIESS EDWIN E & PRISCILLA
TRONO STEVEN A
TROYANEK MARK
VAN DONKELAAR PAUL
VANDENOVER KIP V
VANDERWALL JEFFERY A
VANDERWALL RICHARD & LOIS
VANN STEVEN M
VARGAS MARK & JANA
VARNON GRIFFITH E & JEANNE C
VERHAEGHE RICKY T & MARGARET M
VOELKER MICHAEL R & AMY K
WAGNER MARVIN G & BONNIE B TRUSTEE
WAKEFIELD TIMOTHY
WALKER RIM RIDERS
WALKER SIMON R & CAROLE
WALLINE PHILIP R
WALLIS MORRIS E
WARGNIER DANIEL R & KRIS A
WARGNIER GARY R & JUDY L
WARNER RORY S
WATSON JACK K & KATHLEEN M
WEAGEL WALTER G
WEAVER LARRY & BONNIE
WEBER ROBERTA L
WEICK DONALD E & JERRI L
WELCH DALE E & KELLY A
WELSH DANIEL L
WERNER BYRON J & DONNA J
WEST JESSICA V
WIDMARK FAMILY TRUST
WILBANKS DONNIE D & SAMMY
WILKERSON RICHARD V & CAROL
WILLIAMS GREGORY K
WILLIAMS KENNETH L & ANN M
WILLIAMS STEVEN R
WILSON BARBARA KAY
WILSON GORDON K & LISA R
WILSON TOSHIKO
WINDOM TRACEY
WINNER RONALD W
WIPER WENDE ELIZABETH
WOLD ALEXANDER JR & ROSEMARY
WOLFF BENJAMIN G & JULIE A WESTON
WRIGHT GORDON E
WYLLIE EDWARD B & BLANCHE B
ZELLER ANTON R JR

Public Comment Period Notification List, March 2004

American Forest Resources Council, Chuck Burley
Associated Oregon Loggers, Inc., Jim Geisinger
Bend/Ft. Rock Ranger District, Mark Macfarlane
Bohemia Sno-Sledders, Hal Heideman
Boise Cascade Corporation
Bonneville Power Administration, Libby Johnson
Bureau of Land Management, Division of Natural Resources, Elaine Marquis-Brong
Burns Paiute Tribe, Beth Coahram
Central Oregon Fly Fishers, Ned Austin
Central Oregon Fly Fishers, Robert Speik
Central Point Lumber, Warren Hudspeth
Conf. Tribes of Warm Springs, Scott Stuemke
Confederated Tribes of the Warm, Robert Brunoe
Consolidated Pine, Elden Ward
Crescent Lake Lodge & Resort, Jason Wilson
Crescent-Odell RFPD
Deschutes National Forest, Susan Skakel
DR Johnson Lumber Co., Gerald Keck
Environmental Protection, Judith Leckrone Lee
Forest Action - Survival Center, U of O
Forest Conservation Council, John Talberth
Forestry Action Committee, Susan Chapp
Frontier Advertiser
Herald & News
Jefferson Center, Beverly Brown
KLE Enterprises, Inc. Ken Evans
KTVZ
Native Plant Society, Stu Garrett, M.D.
Northwest Environmental Defense, Erin Uhlemann
Northwest Special Forest Association
NRDC, Travis Faircloth
Ochoco Lumber Company, Bruce Daucsavage
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