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The Greater La Pine Community Wildland Urban Interface Hazardous Fuel Reduction Project Environmental Assessment

EA # OR-056-06-078

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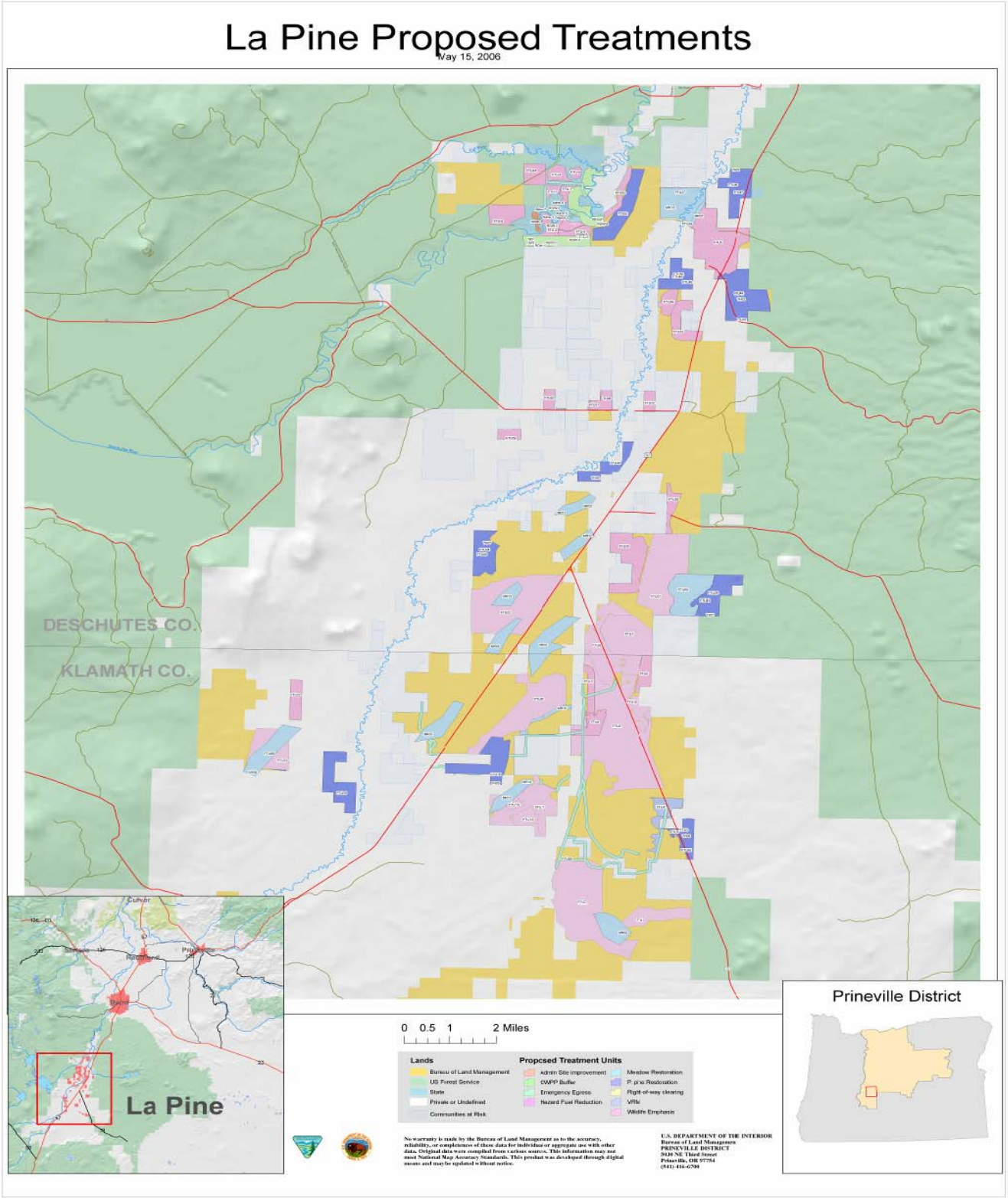
List of Acronyms/Terms

ATV – all terrain vehicle
AUM – animal unit month
BLM – Bureau of Land Management
CAR – Community-at-Risk
CDP – Census-designated place
CFS – Cubic feet per second
CO – Carbon Dioxide
CWPP – Community Wildfire Protection Plan
DBH - diameter at breast height
DFC - desired future condition
DR - decision record
EA – Environmental Assessment
EIS- Environmental Impact Statement
FM – Fuel Model
FONSI – Finding of No Significant Impact
GPS – Geographic Positioning System
HFRA - Healthy Forests Restoration Act
LWD - large woody debris
NEPA - National Environmental Policy Act
ODFW – Oregon Department of Fish and Wildlife
OHV – Off Highway Vehicle
OPRD - Oregon Parks and Recreation Department
ORV – Outstanding Remarkable Values
PM – Particulate Matter
ROW – Right of Way
UDRMP – Upper Deschutes Resource Management Plan
USFS - US Forest Service
VRM – Visual Resource Management
WSR – Wild and Scenic River
WUI – Wildland Urban Interface

Planning Area – boundary of entire area looked for this project; includes all land ownerships and areas not identified for treatment
Project Area – acreage within the planning area specifically identified for a hazardous fuel reduction.

Map 1: La Pine Fuels Reduction Project Area/Treatment Overview



1.0 PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1 Introduction

This Environmental Assessment (EA) has been prepared for the Deschutes Resource Area, Prineville District Office's proposed Greater La Pine Community Wildland Urban Interface (WUI) Hazardous Fuel Reduction Project. The proposed action is the reduction of hazardous fuels within the wildland urban interface. This programmatic EA is intended to consider the area-wide environmental impacts of hazard fuel reduction. This EA implements the tiered process outlined in 40 CFR 1502.20, which encourages agencies to tier environmental documents, eliminating repetitive discussions of the same issue. This programmatic EA will be tiered to the Upper Deschutes Resource Management Plan, the final environmental impact statement (EIS) for approximately 400,000 acres in the Deschutes Resource Area. As a result, this EA is a site-specific analysis of a range of potential impacts that could result from the implementation of the proposed action.

The BLM is proposing to make fuels treatment decisions for the project area by using a two-step planning process. The first stage is the preparation of the Greater La Pine Community Wildland Urban Interface Hazardous Fuels Reduction Project Environmental Assessment (hereafter, the document will be referred to as "La Pine EA"). The decisions made as a result of this analysis, would provide the sideboards and framework for the second step in this process, which is the development and implementation of a site-specific five-year fuels treatments strategy within the Planning Area adjacent to Communities at risk. The Bureau of Land Management has been working with "Communities at Risk" in the Planning Area developing Community Wildfire Protection Plans over the past three years. This process has facilitated the collaboration and activity development between Federal/State/Local agencies, 41 communities at risk (subdivisions) and other stakeholders adjacent to BLM-administered lands that have been identified as needing hazardous fuel reduction.

Environmental Assessments assist the BLM in project planning and ensure compliance with the National Environmental Policy Act (NEPA), as well as in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a "Finding of No Significant Impact" (FONSI). A FONSI is a document that briefly presents the reasons why implementation of the proposed actions would not result in "significant" environmental impacts (effects) beyond those already addressed in the Upper Deschutes Resource Management Plan (2005). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project.

A decision record (DR) may be signed following public comment on the EA to document the decision.

1.2 Background

The last 10 years of wildland fires in central Oregon have set records with respect to the number of large fires, their impact across the landscape and their suppression costs. In 2001, the Crane Complex burned 713 acres and the Pine Forest Fire threatened one of the basin's largest subdivisions. In 2003, the Davis Fire burned 21,181 acres and threatened the subdivision of Wickiup Acres. In 2005 the Park Fire forced the evacuation of 700 people from La Pine State Park and nearby subdivision.

Vegetation in the Planning Area is predominately lodgepole pine (36,121 acres) forest type with scattered pockets that were historically dominated by ponderosa pine (4,912 acres) and a few meadow habitats (3,802 acres). Due to post-settlement fire suppression activities, the forest has become overstocked, primarily from lodgepole pine filling in the understory. The mature overstory, stressed by a lack of resources (water and light), has become susceptible to epidemic mountain pine beetle infestations and subsequent beetle-induced tree mortality. Although the Planning Area has had several timber harvest entries in the past (1977 – 2005), the majority of the Planning Area remains overstocked and in need of treatment to reduce the accumulation of heavy dead and down forest debris, thin abundant ladder fuels and improve the high density forest canopy. In addition, rapid and increasing development in Deschutes County has pushed more and more residents onto property in the wildland urban interface, essentially creating neighborhoods in hazardous areas.

Instead of overstocked stands, the desired future condition (DFC) throughout the wildland urban interface (WUI) of La Pine is a mosaic of vegetation and fuel conditions that reduce the potential for a severe wildfire, increase firefighter and public safety, and promote forest health. These activities will not eliminate fire from the ecosystem, but will promote a future condition on the ground where wildfires burn with low intensity and are more easily contained

1.3 Project Area Description

The Planning Area covers approximately 120,000 acres of mixed public and private ownership. Public land ownership consists of: BLM (42,000 acres), State of Oregon (2,381 acres), and Deschutes County (821 acres). Private timber companies such as Olympic Resources occupy approximately 82,000 acres, and more than 3,500 acres (180 parcels) are privately owned (See Map 1 – Treatment Overview). Within the Planning Area 19,212 acres are proposed for treatment, and all of these acres are within areas designated Wildland Urban Interface.[1]

There currently is a unique relationship between BLM and Oregon Parks and Recreation Department (OPRD)/La Pine State Park. In 1967, BLM granted the State of Oregon

[1] The wildland–urban interface (WUI) is commonly described as the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. This WUI zone poses tremendous risks to life, property, and infrastructure in associated communities and is one of the most dangerous and complicated situations firefighters face.

approximately 1,600 acres of land to create La Pine State Park. Although the land itself was patented to the State, BLM still maintains the timber ownership and the responsibility to manage the vegetation across 1,600 acres of the original patented lands comprising La Pine State Park. This EA also addresses the actions of treating hazardous fuels within the La Pine State Park boundary, with the goal of working collaboratively to reduce hazardous fuels and protect the Park's heritage and administrative sites.

The incentive for communities to engage in comprehensive forest planning and prioritization was given new and unprecedented impetus with the enactment of the Healthy Forests Restoration Act (HFRA) in 2003,. This landmark legislation includes the first meaningful statutory incentives for the US Forest Service (USFS) and the Bureau of Land Management (BLM) to give consideration to the priorities of local communities as they develop and implement forest management and hazardous fuel reduction projects.

Community Wildfire Protection Plans

Communities must first prepare a Community Wildfire Protection Plan (CWPP) to take full advantage of the opportunities authorized by HFRA. These plans can take a variety of forms based on the needs of the people involved in their development. Community Wildfire Protection Plans address issues such as hazard mitigation, community preparedness, or structural vulnerability or structural protection. This EA takes into account the goals and objectives of each CWPP. All of the population centers in the Planning Area have completed CWPPs, identifying 41 separate "communities-at-risk" (CAR). These CARs represent individual or clusters of neighborhood groups with common features and access in the wildland-urban interface as defined in the Upper Deschutes River Natural Resource Coalition CWPP, the Greater La Pine CWPP, or the Crescent-Walker Range CWPP[2]. Based on these CWPP boundaries, the demographics of the planning area have been identified as follows:

Sunriver CWPP

Sunriver, Oregon is a 3,300-acre Private Planned Community located on the Deschutes River about 15 miles (25 km) south of Bend that has a permanent population of 1700. Although this community is located north of the proposed Project Areas, many of the residents and several thousand transient visitors recreate within the Planning Area.

La Pine Area CWPPs

The Greater La Pine Community WUI Hazardous Fuel Reduction Project area covers much of the southern portion of Deschutes County and begins at the southern border of one private community (Sunriver, described above) and contains two census-designated places (CDPs)[3]: La Pine and Three Rivers.

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[2] Complete copies of all CWPPs for central Oregon, including those identified in this document can be found on the Project Wildfire Website at www.projectwildfire.org

[3] A **census-designated place** (**CDP**) is an area identified by the United States Census Bureau for statistical reporting. CDPs are communities that lack separate municipal government, but which otherwise resemble incorporated places, such as cities or villages. They are often informally called "unincorporated towns," and the boundaries of the CDP may not precisely correspond with local understanding of the area with the same name.

As of the 2000 census there were 5,799 people, 2,331 households, and 1,699 families residing in the La Pine CDP. The Three Rivers area (located between Bates Butte and Sunriver) is also a census-designated place in southern Deschutes County. As of the 2000 census, this CDP had a total population of 2,445. Both of these areas are in fairly isolated portions of central Oregon, and consist of a loose collection of homes and businesses along or within several miles of U.S. Highway 97 south of Bend. With overflow development from Bend, much of the residential development is second-home, vacation-homes, and retirement homes, and concealed from the highway itself. La Pine and Three Rivers are near the Little Deschutes River, Fall River and the Deschutes River. These rivers provide recreational opportunities such as fishing, swimming, canoeing, and other leisure activities.

Crescent-Walker Range CWPP

In addition to portions of Deschutes County, the Planning Area covers the northern portion of Klamath County and the population areas of Gilchrist and Crescent. Historically, Klamath County's economy was based on timber and agriculture, and although these natural resource industries now contribute only a small fraction to the region's current economic activity and employment, their legacy lives on in local politics, community identity, and landscape. Gilchrist is a small unincorporated community located in northern Klamath County a few miles south of La Pine. As of the 2000 census, Gilchrist had a total population of 438. There were 248 housing units. The area of Crescent has similar demographics with a total population of 731 and 393 housing units.

1.4 Purpose and Need

This project proposal is designed to move the current conditions found on the La Pine project area toward the management objectives identified for lands by the Upper Deschutes Resource Management Plan (UDRMP), which would be a future condition of a mosaic of vegetation and fuel conditions that reduces the potential for severe wildfire; increases firefighter and public safety; and promotes ecosystem health within the La Pine project area. Specifically, the primary purpose of the project is to improve public safety by reducing hazardous fuels in the La Pine project area; to reduce flame lengths of surface fire; and to reduce the potential for crown fire (wildfire moving through tree canopies, rather than staying on the ground) through manipulation of the vegetation in the La Pine project Area. The secondary purpose of this project is to restore ecosystem health and to improve long-term resiliency to insects, disease and fire. Ecosystem management concepts would be incorporated into fuels reduction treatments and would be a primary consideration in treatments beyond ¼ mile from homes and other developments.

The primary needs for reduction in hazardous fuels, reduction in flame lengths of surface fires, and reduction of the potential for crown fire may be accomplished by achieving the following objectives:

- Reduce the crown fire potential by reducing fuel loading, ladder fuels, and crown bulk density consistent with the Upper Deschutes RMP (UDRMP, pages 61-62). In the planning area, treating approximately 19,212 acres, a reduction of approximately 60% would move us towards this objective.

- Provide for an increase of defensible space areas created within the wildland-urban interface boundary to lessen wildfire intensity and provide conditions where firefighters can be safe and successful in suppression efforts under hot, dry summer weather (UDRMP pages 62-64) by approximately 20% in the planning area; and create a situation where wildfires are easier to control and reduce costs.

The secondary need for improvement in the ecosystem health may be accomplished by achieving the following objectives:

- Manage stand structure, density, species composition, patch size, pattern and distribution to provide an environment in which fire intensity can be managed for human safety and fire effects are compatible with other management objectives (UDRMP, pages 33-34).

- Maintain and improve ecosystem health can be accomplished by recycling nutrients, decreasing competition for water and sunlight, and increasing resistance to insects, disease, and fire (UDRMP, pages 51-55). These activities improve wildlife habitat by increasing quantity and quality of forage and by maintaining and promoting large/old forest structure, riparian, and other diverse habitats.

1.5 Summary of Scoping

Extensive public involvement in the Community Wildfire Protection Plan process greatly informed BLM decisions in the development of the LaPine EA. The ability for the BLM to participate in the creation of the CWPP's provided numerous opportunities to interact with community members and key stakeholders, as well as solicit input regarding the development of the action alternative. In addition to participating in the steering committee for many CWPP meetings, the agency also had the following outreach:

- Interagency Field trip Fall of 2004 involving Oregon Department of Fish and Wildlife, Oregon Department of Forestry, Oregon Parks and Recreation District, Crown Pacific (Crown Pacific lands in this area have been transferred to Fidelity National Timber Resources, Inc.), the Deschutes National Forest, BLM, Upper Deschutes River Natural Resource Coalition CWPP members, Walker Range CWPP project planners, individual landowners and other stakeholders
- Numerous CWPP public outreach meeting spanning 2004 through 2006
- Official Public Scoping Meeting July of 2005
- Official Public Scoping Meeting Field Trip July of 2005

1.6 Issues

The public meetings, tribal/agency consultations, landowner contacts and internal scoping identified several issues concerning the proposed hazardous fuel reduction activities.

1. WILDLIFE: The activities that control fuels may impact wildlife habitat and mule deer travel corridors.
2. RECREATION: The Proposed Action may cause a temporary loss of recreation opportunities while activities are being conducted.
3. ACCESS: The Proposed Action may change the amount and type of motorized and non-motorized access to public lands in the La Pine Basin.
4. THREATENED AND ENDANGERED SPECIES: The proposed fuel reduction activities may temporarily eliminate or reduce the amount of pumice grapefern habitat.
5. TREATMENT OF ACTIVITY CREATED FUELS: Certain activities will produce slash, increasing surface fuel loading.
6. UPPER DESCHUTES WILD AND SCENIC RIVER AND STATE SCENIC WATERWAY: Thinning and burning of trees may affect Outstandingly Remarkable Values for the federally designated river, and Scenic features attributed to the State Scenic Waterway.
7. WATER QUALITY: Harvest activities and prescribed burning may affect Oregon Department of Environmental Quality 303(d) listed parameters of sedimentation and turbidity for the Deschutes and Little Deschutes Rivers. Activities may also affect a proposed 2004 water quality parameter of stream temperature for each river.

1.7 Conformances and Consistency with Land Use Plans, Regulations, and Laws

The activities proposed for the Project Area were developed to be consistent with the all applicable laws and regulations; and with the management objectives for public lands identified in the following documents:

1. This EA conforms to the Upper Deschutes Resource Management Plan (2005) to treat vegetation within the wildland urban interface. Objectives specific to the Upper Deschutes Resource Management Plan include:

- Objective FF – 4, which states "In the wildland urban interface, live and dead vegetation will be managed so that a wildland fire would burn with fire behavior where firefighters can be safe and successful in suppression efforts under hot, dry summer weather conditions. Treatments will be designed for human safety while still considering recreation opportunities, wildlife habitat and corridors, visual quality, air and water quality, and public access" (Upper Deschutes Record of Decision and Resource Management Plan, pages 62-64).

- Objective FF – 3, which directs the agency to "restore and maintain ecosystems consistent with land uses and historic fire regimes through wildland fire use, prescribed fire, and other methods [and to] reduce areas of high fuel loading that may contribute to extreme fire behavior" (Upper Deschutes Record of Decision and Resource Management Plan, pages 61-62).

- Objective V-1d, which directs the agency to "maintain and promote healthy and diverse lodgepole and ponderosa pine forest ecosystems. Manage stand structure, density, species composition, patch size, pattern and distribution and provide an environment in which fire intensity can be managed for human safety and fire effects are compatible with other management objectives...Provide for a balance of biological, social and economical needs in an urban/wildland setting" (Upper Deschutes Record of Decision and Resource Management Plan, pages 33-34).

- Objective W – 4, which directs the agency to "maintain or improve habitats to support healthy, productive and diverse population and communities of native plants and animals (including species of local importance) appropriate soil, climate and landform. Where consistent with habitat capabilities, meet ODFW management objective numbers for deer, elk and pronghorn" (Upper Deschutes Record of Decision and Resource Management Plan, pages 51-55).

- Objective H – 4, which directs the agency to "ensure that water quality (surface and ground) influenced by BLM activities a) achieves or is making significant progress toward achieving established BLM objectives for watershed functions, and b) complies with or is making progress toward achieving Sate of Oregon water quality standards for beneficial uses as established per stream by the Oregon Department of Environmental Quality (ODEQ)" (Upper Deschutes Record of Decision and Resource Management Plan, pages 42-43).

- Objective V – 1e (8b), which directs the agency to restore the extent and diversity of wet and moist meadow and riparian plant communities using techniques such as burning, cutting encroaching conifers, planting native hardwoods, grazing management, fencing, and managing uplands for improved hydrologic function.

- Objective FP – 3, which directs the agency to "help achieve the goals and objectives of the La Pine State Park Master Plan (Oregon Parks and Recreation Department 1986)." BLM will also "offer its expertise in helping to maintain and restore healthy and functioning forest, meadow and riparian ecosystems within La Pine State Park."

2. This EA is consistent with the Greater La Pine, Upper Deschutes River Natural Resource Coalition and the Walker Range Community Wildfire Protection Plans, which have identified 41 Communities-at-Risk throughout the project area and provide the BLM with treatment objectives that focus on reducing hazardous fuels, increasing fire suppression capabilities (defensible space) and improving ecosystem health.

3. This EA is consistent with the Upper Deschutes Wild and Scenic River and State Scenic Waterway Comprehensive Management Plan (1996). Objectives specific to the Upper Deschutes Wild and Scenic River Plan include:

- Vegetation: Upland vegetation will continue to be dominated by ponderosa and lodgepole pine. The forest will be characterized by disturbances which mimic the effects of periodic occurrence of small, low intensity fires, to perpetuate a mosaic of stand structures and ages and reduce the risk of high intensity fires.
- V-6: Meadow restoration will primarily be achieved using prescribed burning or hand tools to remove encroaching vegetation. Other methods which will achieve objectives may be permitted if they would have no adverse effects on Outstandingly Remarkable Values.
- V-12: Some fuel reduction activities (pre-treatment) may be permitted (if such activities would not adversely affect Outstandingly Remarkable Values) to assist in the safe use of prescribed fire and adjacent to private in-holdings to reduce the threat of fire spreading to federal, state, or county lands and elsewhere.
- V-17: Vegetation will appear natural and emphasize protection of riparian plant communities. Any silvicultural practices which provide long-term benefits to Outstandingly Remarkable Values may be allowed.

This EA conforms to all applicable regulations and laws including, in particular, the goals and objectives of the Healthy Forest Restoration Act (2003). HFRA[4] contains a variety of provisions to speed up hazardous-fuel reduction and forest-restoration projects on specific types of Federal land that are at risk of wildland fire and/or of insect and disease epidemics.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The BLM is proposing to reduce the potential for high-intensity wildfires in the Project Area by manipulating vegetation to decrease surface and crown fire behavior. The project would focus on altering the key components of wildfire intensity: surface fuel loading, ladder fuel presence and crown bulk density. Reducing these components would lower wildfire intensity, increase fire suppression effectiveness, and provide for protection of property and resources. In addition, recognizing fire's essential role as an ecosystem process, fuel reduction activities would have the added benefits of helping improve overall forest and range health and preventing large-scale occurrences of insects and disease.

Section 104 of the Healthy Forests Restoration Act provides an alternative analysis process for projects in wildland urban interface areas, including allowing for the development of a single proposed action. The Act states that "If an authorized hazardous fuel reduction project proposed to be conducted in the wildland-urban interface is located no further than 1.5 miles from the boundary of an at-risk community, the [Agency] is not required to study, develop, or describe any alternative to the proposed agency action in the environmental assessment or environmental

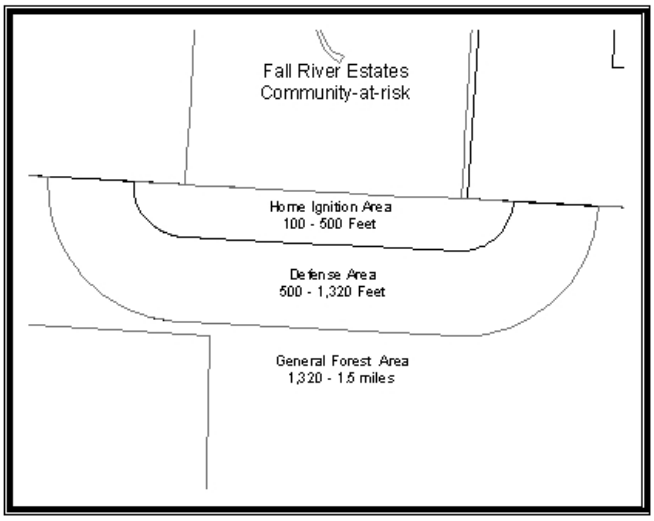
[4] Information on the Healthy Forest Restoration Act and the Healthy Forest Initiative can be found at http://www.fireplan.gov

impact statement prepared pursuant to section 102(2) of the National Environmental Policy Act of 1969(42 U.S.C. 4332(2)).”

2.1 Proposed Action

Following direction provided by the Upper Deschutes Resource Management Plan (2005), the proposed action would focus on treating vegetation within the wildland urban interface (WUI), up to 1.5 miles from community boundaries (See Map 2, Map 3, Map 4 or Map 5) (see Diagram 2-1 for an example of how the different treatment bands might be applied). The WUI boundary would be subdivided into three bands with treatment prescriptions designed to promote low-intensity fire behavior during adverse fire weather.[5] The actual width of these three bands would vary according to site-specific conditions such as vegetation type, stand density, topography, and proximity of structures to public lands. Within the bands, specific treatment units have been developed based on the vegetation classification and stand condition. This programmatic EA is designed for adaptive management principals that will allow for the development of treatment unit prescriptions, treatment methods and desired future condition on a per unit basis (within the range of treatments identified in this EA). These treatments would be accomplished through a collaborative process involving a variety of community members, State, County and Federal employees, private sector business and environmental organizations. Furthermore, in accordance with HFRA, the proposed action would take into account recommendations proposed in approved Community Wildfire Protection Plans.

Diagram 2-1: WUI Treatment Band Concept



[5] Fire Weather refers to weather conditions (temperatures, humidity, fuel moisture, etc.) typically encountered in the summer. In the case of 90th percentile conditions, these would be conditions that are only exceeded ten percent of the time.

The first treatment band closest to non-federally managed property, called the **home protection area,** targets residences, businesses, administrative sites and other key structures and extends out for 100 – 500 feet depending on local site conditions. Vegetation and fuel treatments would be the most intense in this band with the goals of managing for conditions that would not support crown fire and would only allow for surface fires with flame lengths of less that two feet. Providing safe ingress and egress to structures would also be a key factor. The areas identified for treatment band one involve an estimated 1,751 acres.

The **defense area** (second band) extends out from the first band up to approximately one-quarter mile, depending on treatments identified in CWPPs. The goal for this band is designed to prevent crown fire initiation and spread, and keep surface flame lengths below the three to four foot range. Flame lengths below this are considered to be a safe environment for suppression forces to engage in direct attack of the fire. This zone is approximately 3,553 acres.

The **general forest area** (third band) encompasses the remainder of the project area, furthest away from homes and up to 1.5 miles (approximately 22,343, acres). Vegetation and fuel treatment goals in this band would be designed to reduce the occurrence, size and severity of crown fires by breaking up fuel continuities and limiting ladder fuels. Most wildland fires would be limited to surface fires less than four foot flame length with limited passive crown fires. Treatments goals would also place a higher emphasis on wildlife habitat and silvicultural needs as long as fuel continuities and ladder fuels are reduced on at least 50 percent of the area.

Ninety-eight units have been identified throughout the Planning Area (See Table 2-2) for treatment of approximately 28,000 acres within the three treatment bands. Treatment prescriptions may vary; however, all treatments will fall within the range of treatment prescriptions (See Appendix A).

Table 2-2: Proposed Treatment Prescriptions by Unit (See Treatment Methods, below, for complete descriptions of each treatment method)
(PCT – pre-commercial thin; CT – Commercial Thin; Rx – Prescribed Burn)
Refer to Map 3, Map 4 and Map 5 for unit location and Appendix A for prescription detail.

Unit_ID	ACRES	Treatment	Treat_Type	Treat_Rx	Location
ROW-1	9.8	Right-of-way clearing	PCT, PILE, RX, MOW	20 - 30 ft spacing	Southwest Corner of Park
ROW-2	5.9	Right-of-way clearing	PCT, PILE, RX, MOW	20 - 30 ft spacing	Day-Use Area
ROW-3	3.8	Right-of-way clearing	PCT, PILE, RX, MOW	20 - 30 ft spacing	McGregor Road Viewpoint
ROW-4	3.9	Right-of-way clearing	PCT, PILE, RX, MOW	20 - 30 ft spacing	5th Street
ROW-5	7.8	Right-of-way clearing	PCT, PILE, RX, MOW	20 - 30 ft spacing	Southeast corner of park
ROW-6	0.2	Right-of-way clearing	PCT, PILE, RX, MOW	20 - 30 ft spacing	Southeast corner of park
Admn-1	3.7	Admin Site improvement	PCT, LIMB, PILE, RX, MOW	20 ft spacing	Ranger Home/Park Office
Admn-2	0.9	Admin Site improvement	PCT, LIMB	20 ft spacing	Day-use Restrooms

Unit_ID	ACRES	Treatment	Treat_Type	Treat_Rx	Location
Admn-3	5.8	Admin Site improvement	PCT, LIMB, PILE, RX, MOW	20 ft spacing	Bridge Trailhead
Admn-4	1231.9	Admin Site improvement	PCT, LIMB, PILE, RX	20 ft spacing	Big-Tree Trailhead
Admn-5	1.0	Admin Site improvement	PCT, LIMB, PILE, RX	20 ft spacing	Boat Launch
Admn-6	2.2	Admin Site improvement	PCT, LIMB, PILE, RX	20 ft spacing	McGregor View Point
Admn-7	1.5	Admin Site improvement	PCT, LIMB, PILE, RX	20 ft spacing	Recycle Center / Admin Booth
Admn-8	30.4	Admin Site improvement	no treatment	no treatment	Campground
FTU-6	220.0	Hazard Fuel Reduction	CT, PCT	20 ft spacing	West Side Block
FTU-1	114.6	Hazard Fuel Reduction	CT, PCT	20 ft spacing	Northeast Block
FTU-3	62.8	Hazard Fuel Reduction	CT, PCT	20 ft spacing	Southeast Block
FTU-4	122.1	Hazard Fuel Reduction	CT, PCT	20 ft spacing	South of River, day use area
FTU-9	37.3	Hazard Fuel Reduction	CT, PCT	20 ft spacing	NE Block
FTU-8	95.2	Hazard Fuel Reduction	CT, PCT	20 ft spacing	NE Block
FTU-7	44.3	Hazard Fuel Reduction	CT, PCT	20 ft spacing	West Boundary
FTU-5	143.0	Hazard Fuel Reduction	CT, PCT	20 ft spacing	South of River, day use area
FTU-2	-496.4	Hazard Fuel Reduction	CT, PCT	20 ft spacing	West of River, park entrance
SD-buf2	237.3	CWPP Buffer	PCT,LIMB, PILE, RX, MOW	20 - 30' spacing	Park Street Subdivision
SD-buf1	334.2	CWPP Buffer	PCT, LIMB, PILE, RX, MOW	20 -30' spacing	Home Rec Site Subdivision # 6
FTU1	336.2	Wildlife Emphasis	PCT, LIMB, PILE, RX, MOW	18 - 20 foot spacing	Oregon Outback/Sun Forest Meadows
FTU2	1483.8	Wildlife Emphasis	PCT	Patch cut 20-30% unit	Oregon Ouback/Split Rail
FTU3	190.5	P. pine Restoration	PCT	70-80 BA	Oregon Outback Cluster
FTU4	223.1	VRM	PCT	70-80	Oregon Outback Cluster
FTU5	143.7	Hazard Fuel Reduction	PCT	30 x 30 spacing	Oregon Outback Cluster
FTU6	1958.2	Wildlife Emphasis	PCT	18-20 foot spacing	Outback Cluster/HWY 31
FTU7	718.6	Wildlife Emphasis	PCT	18-20 spacing	Oregon Outback Cluster
FTU8	145.2	Hazard Fuel Reduction	PCT, PILE, RX, MOW	20-30 ft spacing	Oregon Outback/Beal Road
FTU9	562.0	Wildlife Emphasis	PCT	18-20 ft spacing	Oregon Outback Cluster
FTU10	262.9	Wildlife Emphasis	PCT	18-20 spacing	Oregon Outback Cluster
FTU11	148.7	Hazard Fuel Reduction	PCT	20-30 ft spacing	Oregon Outback Cluster/Beal Rd
MR15	85.4	Meadow Restoration	Mechanical	Treat 50% of Area	Oregon Outback Cluster/Antelope M
FTU15	494.0	P. pine Restoration	PCT	70-80 BA	Oregon Outback Cluster/Ant.Mead.

Unit_ID	ACRES	Treatment	Treat_Type	Treat_Rx	Location
MR16	67.3	Meadow Restoration	Rx Fire	broadcast	Oregon Outback Cluster/Ant.Mead.
FTU68	846.1	Emergency Egress	PCT	30 x 30 spacing/mow brush	Wagon Trail
FTU66	476.9	P. pine Restoration	CT	70-80 BA	West Block
FTU17	591.1	Wildlife Emphasis	PCT	18-20 ft spacing	Oregon Outback Cluster/Ant.Mead.
FTU 18	144.0	Wildlife Emphasis	PCT	Patch cut	Oregon Outback Cluster/Ant.Mead
FTU 19	39.7	Wildlife Emphasis	PCT	18-20 ft spacing	Oregon Outback Cluster/Ant. Mead
FTU20	401.6	P. pine Restoration	CT, PCT	18-20 ft spacing	Hwy 97 Cluster
FTU21	535.7	Wildlife Emphasis	Rx Fire	underburn	Hwy 97 West Cluster
FTU22	158.6	Hazard Fuel Reduction	PCT	20-30 ft spacing	Hwy 97 West Cluster
FTU23	1343.4	Wildlife Emphasis	PCT	18-20 spacing/patch cut	Masten Road Cluster/Airport
FTU24	322.2	P. pine Restoration	PCT	20-20 ft spacing	Masten Road Cluster
FTU25	117.9	Hazard Fuel Reduction	PCT	20-30 ft spacing	Huntington South Cluster
FTU37	128.0	Hazard Fuel Reduction	PCT	20-30 ft spacing	Whispering Pines
MR14	452.2	Meadow Restoration	Mechanical	Treat 50% of Area	New parcel
TH01	352.2	P. pine Restoration	CT	70-80 BA	Huntington South Cluster
FTU27	971.2	Wildlife Emphasis	PCT	18-20 ft spacing	Huntington South Cluster
FTU28	494.6	Hazard Fuel Reduction	PCT	20-30 ft spacing	Huntington South Cluster
FTU29	81.9	Hazard Fuel Reduction	Mechanical	Mow brush component	6th and Dorrance Cluster
FTU30	76.8	Hazard Fuel Reduction	Mechanical	Mow brush component	Day Road Corridor
FTU31	115.8	Hazard Fuel Reduction	PCT	20-30 ft spacing	Day Road Corridor
FTU32	78.8	Hazard Fuel Reduction	PCT	20-30 ft spacing	Day Road Cluster
FTU33	552.5	P. pine Restoration	Rx Fire	Underburn	Little Des.River/Newbery Cluster
TH02	212.8	P. pine Restoration	CT	70-80 BA	6th & Dorrance Cluster
FTU35	233.5	Hazard Fuel Reduction	CT	20-30 ft spacing	Little Deschutes River Cluster
FTU36	122.2	Hazard Fuel Reduction	PCT	20-30 ft spacing	Little Deschutes River Cluster
FTU39	35.0	Right-of-way clearing	Mechanical	20-30 ft spacing	State Rec Road
FTU40	212.8	P. pine Restoration	Rx Fire	70-80 BA	6th & Dorrance Cluster
FTU41	352.2	P. pine Restoration	Rx Fire	underburn	Huntington South Cluster
TH03	552.5	P. pine Restoration	CT	70 -80 BA	Little Des.River/Newbery Cluster

Unit_ID	ACRES	Treatment	Treat_Type	Treat_Rx	Location
FTU44	552.5	P. pine Restoration	PCT	70 -80 BA	Little Des.River/Newbery Cluster
TH04	349.4	P. pine Restoration	CT	70-80 BA	Des. River Rec two
FTU46	349.4	P. pine Restoration	PCT	70-80 BA	Des. River Rec two
FTU47	349.4	P. pine Restoration	Rx Fire	underburn	Des. River Rec two
FTU48	239.9	P. pine Restoration	Rx Fire	underburn	Little Des.River
FTU49	239.9	P. pine Restoration	PCT	70-80 BA	Little Des.River
FTU50	239.9	P. pine Restoration	CT	70-80	Little Des.River
FTU51	410.0	P. pine Restoration	Rx Fire	underburn	Deschutes Home Rec Site/UDNRC
FTU52	108.8	Hazard Fuel Reduction	Rx Fire	hand-pile	Deschutes Home Rec site/UDNRC
TH05	494.0	P. pine Restoration	CT	70-80 BA	Oregon Outback Cluster/Ant.Mead.
FTU3	190.5	P. pine Restoration	PCT	70-80 BA	Oregon Outback Cluster
TH06	190.5	P. pine Restoration	CT	70-80 BA	Oregon Outback Cluster
FTU55	190.5	P. pine Restoration	Rx Fire	underburn	Oregon Outback Cluster
MR01	199.6	Meadow Restoration	Rx Fire	Treat 50% of Area	New parcel
MR02	23.2	Meadow Restoration	Rx Fire	Treat 50% of Area	South of La Pine High School
MR05	146.9	Meadow Restoration	Rx Fire	Treat 50% of Area	Masten Block
MR06	372.9	Meadow Restoration	Rx Fire	Treat 50% of Area	North of Antelope Meadows
MR07	234.6	Meadow Restoration	Rx Fire	Treat 50% of Area	West HWY 97
MR08	335.1	Meadow Restoration	Rx Fire	Treat 50% of Area	West side of La Pine Block
MR09	229.8	Meadow Restoration	Rx Fire	Treat 50% of Area	South of Sun Forest
MR10	154.4	Meadow Restoration	Rx Fire	Treat 50% of Area	West of Split Rail
MR11	129.0	Meadow Restoration	Rx Fire	Treat 50% of Area	South of La Pine High School
MR12	131.3	Meadow Restoration	Rx Fire	Treat 50% of Area	West of HWY 97, Masten allotment
MR13	119.8	Meadow Restoration	Rx Fire	Treat 50% of Area	South of Masten Road
FTU26	352.2	P. pine Restoration	PCT	70-80 BA	Huntington South Cluster
FTU57	880.5	Wildlife Emphasis	PCT	18-20 ft spacing	NW of Antelope Meadows
TH07	322.2	P. pine Restoration	CT	70-80 BA	Masten Road Cluster
FTU58	322.2	P. pine Restoration	Rx Fire	underburn	Masten Road Cluster
FTU65	439.6	Meadow Restoration	PCT	15-20Ft spacing	East HWY 31

Unit_ID	ACRES	Treatment	Treat_Type	Treat_Rx	Location
TH08	115.0	Hazard Fuel Reduction	CT	40 BA	Day Road Corridor
FTU5	823.0	Hazard Fuel Reduction	Mechanical	70-80 BA	HWY 97 Corridor
FTU64	160.4	Hazard Fuel Reduction	PCT	70-80 BA	West of La Pine State Park

Treatment Methods

A variety of methods would likely be used in the Project Areas. The majority of the treatments would be mechanical, requiring the use of equipment - either rubber-tired or track-mounted, and many prescriptions would require more than one entry. For example, commercial thinning could be followed by pre-commercial thinning and mechanical slash treatment, with each treatment completed using different equipment. Since a variety of machines are capable of accomplishing a treatment, the exact type of equipment used at the time of treatment cannot be predicted. The following methods could be available:

Mechanical

- Commercial Thinning (approximately 3,583 acres) - generally utilizes small three-wheeled or bobcat mounted shears, or larger track-mounted shears/hot-saws with swing boom, delimbers, skidders and feller bunchers.
- Non-Commercial Thinning (approximately 15,692 acres) - can involve either rubber tired, or tracked machines or hand chainsaw methods, depending on the type of stand and objectives.
- Machine Piling - usually done by tracked machine with brush rake, sometimes with a rubber-tired skidder or bobcat. A tracked vehicle with grapples may also be used.
- Masticating/Mowing (approximately 3,105 acres of treatment) – can be implemented by tracked or wheeled machine to cut or break material to lower the fuel profile, reduce piece size, and put material into contact with the ground.

Hand

- Pre-commercial thinning or pruning - manual cutting using a chainsaw.
- Hand piling of treatment or natural fuels (approximately 1,751 acres)

Prescribed Fire

These treatments could include low-intensity burning of larger areas (broadcast), intense burning of small areas to create small openings (jackpot burning), and pile burning to reduce or eliminate debris and slash. Specifically, according to treatment area the following methods would be expected:

- Hand or Machine Pile Burning (approximately 1,051 acres) - high intensity, small area impacts.
- Ponderosa Pine Stand Maintenance (approximately 3,538 acres) - low-intensity underburning
- Lodgepole Pine Regeneration (approximately 700 acres) - high intensity underburning to create “holes” in the canopy

- Meadow/Riparian Treatments (approximately 3,120 acres) - broadcast burning of mechanically pre-treated adjacent lodgepole pine thickets. Some fire spread into the meadow area is expected and desirable.

The site-specific methods for each treatment unit would be selected based on the current condition of the vegetation, visual resource management considerations and input from adjacent communities through Community Wildfire Protection Plans (See www.projectwildfire.org for the complete CWPP documents for central Oregon).

This project is expected to be implemented over a five to seven year period, depending on budget and work load factors (See Map 6 and the 5-Year Treatment Schedule). It also provides for maintenance treatments within the Home ignition band on a five to seven year rotation in order to keep fuel loading and crown fire potential minimized.

2.2 Best Management Practices

Fire/Fuels

Before implementing any prescribed fire project, a prescribed burn plan must be written in accordance with BLM Prescribed Fire Manual 9214. The prescription to manage smoke, vegetative and soil impacts would require favorable weather conditions that minimize effects to communities and ecosystem.

Natural and activity created slash remaining within the home protection zone, adjacent to administrative sites, emergency egress/right-of-ways and visually sensitive areas would be hand/machine piled.

Vegetation

Botanical surveys would be performed prior to any fuels treatment. If special status plants are found or suspected at any site proposed for treatment, site-specific treatment protocol would be determined such that habitat would be restored, or at the least not be negatively affected in the long term. This may include, for example, winter treatment, mowing or burning after plant dormancy, removal of slash and debris, hand treatment only or felling of trees/piling of debris away from primary special status plant habitat. Special status plant habitat would be avoided if necessary.

Post-treatment disturbance of all sites would be kept to a minimum to allow sites to recover. Recovery time needs to be determined on a site-by-site basis and would preclude all potential disturbances, such as thinning, subsequent fuels treatment, livestock grazing, firewood harvest, recreation, etc.

Weeds

Prior to arriving at a fuels treatment unit in the project area all vehicles/equipment would be washed to remove noxious weed seeds from the vehicle/equipment undercarriage. This would

only apply to vehicles/equipment that have been outside the Project Area. Once the vehicle/equipment has been washed and remains in the project area, no further washing would be required.

Livestock Grazing/Range

Excessive ground fuels limit the growth of necessary vegetation for livestock; therefore, mitigating measures would be implemented when activity generated fuels exceed two tons per acre. Acceptable measures to reduce fuel buildup include: prescribed fire, or hand or machine piling.

As described in the Upper Deschutes RMP, after prescribed burns, livestock grazing would typically be excluded through the next growing season, and potentially up through the second full growing season. Any fences or gates that are cut or damaged would to be repaired by the agency or contractor before permitted livestock are turned out to graze the allotment.

Soils

Monitoring effectiveness and implementation of mechanical commercial thinning, mechanical non-commercial thinning and mechanical machine piling would ensure that project activities are not promoting detrimental soil conditions. Specifically, keep detrimental soil disturbance impacts to less than 20 percent and keep three pass plus skid trails to distances of 100 ft apart or greater. In addition, apply the following best management practices and mitigations in areas of roads and traffic, soil compaction and displacement, and thinning practices:

Roads and Traffic

- Improve or re-route rutted and puddled portions of main traffic access routes in the project area. Decommission and rehabilitate displaced, parallel routes.
- Limit construction of new roads in the project area to those that would reduce cumulatively, the effects of rutting, soil compaction, and soil disturbance hazards
- Designate main traffic routes for timber haul route access, and local home access.

Soil Compaction and Displacement

- When frozen ground has 6 or more inches of snow cover, no pass limitations would be identified for ground based yarding equipment.
- Operate track or wheeled machinery not on frozen ground, during periods dry or moist soil moisture, in the range of 75 percent of field capacity and wilting points, or allow mechanical treatments only when soil moisture conditions are dry or moist and not wet as defined in attached guidelines for estimating soil moisture conditions.
- For ground based yarding or mechanical treatments, if ground is not frozen or snow-covered, designate main arterial trails (over 3 passes [out and back on the same trail = 1 pass]) or use a recording GPS in the skidder to identify skidder paths, and keep spacings to 100 ft or more.
- Rehabilitation methods could include subsoiling skid trails used more than three times, with excavator tiller or with winged subsoiler, planting with native trees, shrubs, and grasses, and pulling wood slash and organic debris back onto the skid trail.

- For dry and moist ground – ground based equipment would be subject to a three pass limit, monitor and check for compaction effects and apply rehabilitation treatments for units found to be over 20 percent detrimental soil conditions.
- For wet ground loamy sand texture - if soil forms a weak ball when squeezed in hand with a heavy soil/water coating and loose aggregated sand grains remaining on fingers or if wet outline of soft ball remains on hand – do not operate.
- Avoid excessive maneuvering and sharp turns with track or wheeled machinery.
- Keep chipping trucks and machinery on skid trails and landings.

Thinning Practices

- For non-commercial size trees (generally trees less than 6 inches DBH, promote hand-felling, rather than machine treatment in sensitive areas or soils prone to compaction.
- Scatter small non-commercial trees and slash on the ground from thinning operations, while still meeting fire hazard reduction standards. Less slash will be left in home protection zones, emergency egress routes, administrative sites and VRM sensitive areas. A slash rate of about 1/4 to 3/4 pound per square foot was recommended for forest health in ponderosa pine stands (Chap 7 pp 138-139 - Debano and others, 1998). In lodgepole pine stands, keep as much coarse woody slash on the ground as possible. This practice is designed to reduce compaction from un-controlled OHV traffic, recycle nutrient capital back into the soil, and reduce amount of slash piles to reduce severe burn area effects on the soil.
- Pile excess cut slash material first onto areas of existing detrimental soil compaction such as skid trails and landings.
- When available, it is preferable to machine pile using a tracked excavator with a grapple or bucket with long teeth and opposing fingers. This helps keep the soil in place and not on the slash pile.
- Avoid mowing highly decayed down woody material on the soil surface.

Recreation

BLM-administered lands in the Planning Area are in an interim road and trail designation status pending development of a detailed travel management plan for the La Pine portion of the UDRMP. In areas where vegetative removal would open up access for motorized and non-motorized use, all motorized or mechanized travel would be restricted to designated routes. This would be implemented by signing existing roads and trails. Major access points to these areas would be signed to inform the public of this restriction. If not already completed, the existing routes should be GPS'd prior to any ground-disturbing activities.

This measure would not be considered as part of a transportation plan but as an interim travel management restriction to prevent additional user created roads and trails from being developed. Cost to implement this action would be contained by using minimal signing (carsonite posts) and youth corps or county work crews for labor. In certain circumstances, existing unofficial (user created) roads and trails may be in conflict with the overall proposed action and should be closed in lieu of interim designation. Such circumstances would be where access threatens rare or threatened species or where access would pose an increased risk of fire or public hazard. These closures would be decided on a case by case basis in areas being treated. Closure would be

implemented by blocking or obliterating the beginning and end portion of the route, followed by signing to indicate area was being rehabilitated. No previously designated, approved or maintained routes would be closed under this measure.

Visual Resource Management (VRM)

In order to maintain or improve the visual character of the Planning Area, activities would be designed to:

- Monitor changes to visual resource during project
- Stockpile locations and pits, slash piles outside of immediate foreground
- Enhance background and vista views
- Thin, prune or clear the undulating or feathered corridor edges and mimic meadows
- Manage stands to clear dead, down, and thin young trees and understory, diversifying age classes and vertical layers for increased visual diversity
- Maintain riparian, meadow and or old growth tree visual values

Wildlife

The following wildlife and wildlife habitat mitigations would be incorporated into the treatments:

<u>Deer Migration Corridor</u>

1. *Amount (percent) of cover retained*: Forty percent of BLM managed lands will be retained as suitable hiding cover to facilitate the use of and movement of mule deer through public lands. This includes vegetation managed in the La Pine State Park.
2. *Scale to determine amount of cover*: Determining the amount of cover to be retained generally should not be calculated at the unit level, but should consider the general area surrounding the treatment area in such a way as to maintain connectivity of cover areas across the entire migration corridor.
3. *Size of cover patches*: Where possible (based on the amount and location of available suitable hiding cover) the minimum cover patch size should be approximately 6.5 acres, and have a minimum width of at least 600 feet.
4. *Location of cover patches*: Cover Patches should be located within 1,200 feet of another suitable cover patch to help provide connectivity of cover across the migration corridor. Locate cover patches away from roads, homes and other areas where people frequent. Also, when near water locate cover patches within 1,000 feet of water sources.
5. *Hiding cover treatments*: In general, retained hiding cover areas may be thinned when treatments will maintain or enhance suitable cover conditions (in consultation with ODFW).
6. *Areas lacking 40 percent hiding cover*: In areas where there is less than 40 percent hiding cover, treatments would be limited to fuels within the first 500 ft band and possibly in the second band depending on the abundance of fuel loads. Thinning around individual mature and old growth ponderosa pine trees would be allowed

throughout a treatment unit.

7. *Transportation management*: To mitigate the loss of hiding cover and improve the habitat effectiveness of an area, roads that are not part of the interim road system may be closed.

Snags and Down Logs

1. Trees used to meet the snag and down log requirements will be selected from the largest trees available.
2. In ponderosa pine stands retain at least two hard snags (≥9 in. dbh) per acre.
3. In lodgepole pine stands retain at least six hard snags (≥9 in. dbh) per acre.
4. Where available, ponderosa pine trees will be selected for meeting the snag and down log requirements.
5. Retain at least 120 lineal feet of down logs (Class 1 and 2) per acre greater than or equal to 8 inch in diameter at the small end. Logs less than 12 feet in length will not be credited toward this total.
6. Some snags and down logs may be removed for safety reasons.
7. Retain all soft snags (stages 5-7) and down logs (Classes 4-6) from harvest and avoid destroying them during treatments. These snags and down logs do not count toward the hard snag and down log requirements. Some areas may have an over abundance of soft snags and down logs which may require some to be removed in order to facilitate vegetation management prescriptions.
8. In areas short in supply of hard snags and down logs, retain the largest green trees that would otherwise be harvested and use them to manage for snag and down log habitats.
9. Where hard snags and down logs are abundant, some may be harvested, but the largest snags and down logs available will be retained.
10. Snags do not need to be evenly distributed across a treatment area. If a clump of large snags is present, the clump may be retained to meet the snag requirements.
11. Where possible distribute down logs evenly across the treatment area.

3.0 AFFECTED ENVIRONMENT

Fire/Fuels

In the last century, fire prevention and suppression policies decreased fire's influence on the ecosystem. Prior to European settlement, fire occurred in the Planning area every 20 to 100 years either through natural or indigenous people ignitions. These periodic natural fires varied in intensity, sometimes thinning small trees and undergrowth, sometimes destroying entire stands. Thinning by light ground fires allowed surviving trees to grow larger. More extensive fire mortality allowed for regeneration of entire stands. Natural fire also maintained a higher percentage of more fire-resistant ponderosa pine on some sites. Understory plants were burned off allowing for the rejuvenation of bitterbrush, bunchgrasses, and forbs. Fires would also burn through meadows, killing encroaching tree seedlings and maintaining the extent and integrity of interspersed meadow plant communities within the lodgepole pine forest.

In the absence of periodic fires, lodgepole pine, ponderosa pine, and meadow communities have changed from the composition expected under a natural fire regime. These plant communities depend on periodic natural fires for maintenance and regeneration. Consequently, lodgepole pine stands have developed an overly mature and dense condition. Insects and diseases have increased and tree health and vigor have declined. Forb and grass species have declined in diversity and density. Bitterbrush density has increased and plants have become old and decadent on many sites. Meadows have declined in size and species diversity. This trend in plant community and structural changes is likely to continue in the absence of natural fire.

Residual dead and down trees, dense "doghair" lodgepole regeneration, and dense and decadent bitterbrush combine to present a high fuel loading and ladder fuel situation that continues to pose a serious threat of wildfire in portions of the Planning Area. The situation is exacerbated by the rapid population growth and development in the Planning Area, which has pushed residential areas deeper into the forest. Treatments in recent years have focused on reducing fuels within the WUI and adjacent to major roads and highways. However, there are still many areas of concern near homes, roads, and other developments.

Natural fire also played a very important role in maintaining the ecological integrity of ponderosa pine stands in the area, and low-intensity wildfires burned through these sites every 4-24 years (Agee, 1993). These periodic ground fires usually burned in a mosaic pattern and consumed duff, needles, broken branches, shrubs, and small trees. Grasses and forbs were maintained in a denser, more vigorous, and more diverse condition. Prior to decades of fire suppression, portions of the Planning Area had nearly pure ponderosa pine stands with open, one or two layer canopies, low density, and large/old trees.

There is a distinction between the fire ecology of lodgepole pine stands and ponderosa pine stands. To represent these differences and to model the differences between the two ecosystems, fire ecologists look at fire regime. Fire regime describes the frequency and severity at which particular ecosystems burnt with naturally occurring wildfires. Ponderosa pines fits into Fire Regime 1 with low intensity wildfires occurring on average very 4 – 28 years. Lodgepole pine, on the other hand, would fall into the category of Fire Regime 3, with high severity, stand-

replacing fire occurring every 35 – 100 years. Meadows were kept open by frequent fire, which kept encroaching lodgepole pine contained to the perimeter. This project aims to reduce lodgepole pine in ponderosa pine stands and meadow ecosystems. The process will restore a more natural (historic) condition on the landscape, and one that, when wildfire is present, supports low-intensity fires with flame lengths that fire suppression crews can safety fight on the ground. Since lodgepole pine typically burns in a manner that produces a stand-replacing crown fire, project goals within lodgepole pine sites are not to maintain natural processes, but to decrease stand density and reduce the likelihood of crown fire.

Fire suppression, beginning in the early 1900s, substantially altered ponderosa pine stand structure. An absence of fire allowed an abundance of seedlings and saplings of lodgepole and ponderosa pine to establish underneath the larger trees. Current stand structure on ponderosa pine sites is now a mixture of ponderosa and lodgepole pine, much denser, and with a smaller average diameter. As lodgepole pine gains in dominance, larger ponderosa pines are becoming increasingly stressed and susceptible to insects, disease, drought, and fire (See Map 7: Vegetation Classification for the La Pine Basin).

One of the primary issues with removing fire is the buildup of dead and downed material on the ground and the increase in numbers of standing live trees. To gather information on how much fuel has accumulated on the forest floor, the weight of vegetation contained in the tree canopies (crown bulk density) and the types of species present in the basin, plots were randomly selected and surveyed. This stand data was used to predict the potential for extreme fire behavior and crown fire potential, as well as determine the fuel types[6] represented in the project area.

As a result of the field examinations, the Planning Area can be categorized into four fuel models: Fuel Model 1, (grass), Fuel Model 6 (moderate density shrubs), Fuel Model 8 (conifer litter, low fuel load) and Fuel Model 11 (forest litter, moderate load). In addition, computer models used the crown bulk density data to determine areas where the tree canopies would be able to spread fire from tree crown to tree crown (Table 3.1).

Table 3.1 Acreages of Fuel Models across the Planning Area.

Fuel Model	Expected Fire Behavior	Acres
FM 1	surface fire	3,120
FM 6	surface fire	14,692
FM 8	crown fire potential	8,827
FM 11	crown fire potential	4,912
Total		**31,551**

[6] The 13 fire behavior ground fuel models (Rothermel 1972, Albini 1976) and their arrangement across the landscape interpret fire behavior potential. These models, as defined, are used in conjunction with BEHAVE, a fire modeling/prediction software program that can predict fire behavior based on fuel model delineation and environmental factors.

Vegetation

Vegetation classification within the Planning Area can be described in terms of three broad types; lodgepole pine, ponderosa pine, and riparian/meadow plant communities.

The Planning Area is primarily made up of lodgepole pine plant communities that are in a series of different seral stages and structural conditions. Ponderosa pine and riparian (with meadow) communities are also present and exist in a variety of conditions. The proposed treatment units are located on BLM-administered lands situated in a mixed ownership pattern of private, state and Forest Service-administered lands.

In the Planning Area, the BLM administers approximately 42,000 acres. Of these lands approximately 38,061 acres contain lodgepole and ponderosa pine forest associations. These plant communities are dynamic systems that are always moving through stages of development. Recent silvicultural treatments have focused on removing most of the competing lodgepole pine from stands with a ponderosa pine component of 25 percent or greater in the overstory. The objective of these treatments is to restore and maintain ponderosa pine communities in range, composition, and structure close to its historic range of variability. Because ponderosa and lodgepole pine often grow together, there is little data available to describe the amounts and locations of pure stands of either species. Therefore, the following breakdown of seral stages groups the two species together. Of the lodgepole and ponderosa pine communities located on BLM lands, 13 percent (5,078 ac.) are in the early seral stage of seedling-sapling; 54 percent (20,590 ac.) are in the sapling-pole stage; 30 percent (12,129 ac.) are in the mature stage and less than one percent (264 acres) are in an old growth stage. Lodgepole pine generally do not exist in an old growth state and tend to die at the mature stage due to insect infestation or stand replacing fires that kill large stands returning them back to an early seral state.

These three broad vegetation types are described below, followed by more specific discussions of special status plant species and noxious weeds.

Lodgepole Pine

Pure, or nearly pure, lodgepole pine plant communities are the dominant vegetative type in the Planning Area, comprising approximately 90 percent (36,121 acres) of the BLM-administered lands. In this area, bitterbrush and Idaho fescue are the dominant understory plants; however, on some sites bottlebrush squirreltail and needlegrass are the dominant grasses instead of fescue.

The ecological status of lodgepole pine is that of a pioneer or invader species that is dependent on disturbance for its long-term dominance, health and vigor. This prolific species can also germinate and grow in frost pockets, soils with high water tables, and soils with low fertility, all conditions that can be found in the project area. Lodgepole pine rapidly colonize and dominate a site following disturbance such as wildfire, windthrow, insects and disease.

Mature lodgepole pine stands comprise 30 percent (~12,500 acres) of BLM-administered lands in the Planning Area. Generally, the structure is comprised of a remnant overstory of scattered larger trees up to 18-20 inches diameter at breast height (DBH) with understory pockets of very dense seedlings, saplings, and suppressed pole-sized trees (in densities of up to 5,000 trees per

acre). Stand condition is generally poor, with a very high occurrence of insects and disease, slow growth, and continuing mortality of individuals and small groups of trees.

During the late 1970s and 1980s a severe mountain pine beetle epidemic occurred over vast acreages of the lodgepole pine forests in central and southern Oregon. The Planning Area falls into the northern end of this affected area, and stand structure was drastically altered due to the beetle epidemic. Beetle-caused mortality of the overstory (trees eight inches DBH and larger) ranged from 30-80 percent, thinning the overstory and creating many openings, which allowed the growth of dense patches of seedlings. Currently, most of the trees killed by the beetles that were not harvested have fallen to the forest floor and are in varying stages of decay, and the remaining dead trees from this epidemic are expected to all be down within another 5-10 years. Under natural conditions, large intense wildfires would either precede and prevent large-scale insect attacks, or consume the dead trees and provide conditions for stand regeneration following a major insect attack. Human fire suppression in the last 120 years has extended the longevity of the current lodgepole pine late seral condition.

In addition to beetle-induced mortality, approximately 70 percent (~29,000 acres) of the BLM-administered lands in the Planning Area have had some type of harvest treatment in the last 20 years (Map 8: Historic Treatments). The primary objectives for the treatments were to alleviate the extreme fire hazard created by the beetle epidemic, salvage timber for wood products, and regenerate new healthier stands. Most of these treated areas are now in varying stages of natural regeneration, ranging from a low density of post-harvest remnant trees and new seedlings to densely established saplings 10-15 feet tall. Prior to the beetle treatments of the last 20 years, earlier harvests occurred over nearly the entire La Pine area from the 1940s to the 1970s. These logging entries were generally low-intensity salvage or single-tree selection harvest of larger diameter ponderosa and lodgepole pine.

Insects and disease continue to impact the mature lodgepole stands. Endemic levels of mountain pine beetle are still present in these stands, killing an occasional tree or small group of trees. Timber harvest and pre-commercial thinning treatments have substantially reduced the risk of another major beetle epidemic in the short-term. However, as the remaining smaller trees and new seedlings grow and stand density increases over the next 20 to 50 years, conditions could once again support another major beetle or disease epidemic.

Ponderosa Pine

Ponderosa pine in the Planning Area occurs in relatively small stands and as scattered individual trees. Approximately eight percent (~4,912 acres) of the BLM-administered lands in the Planning Area are ponderosa pine or mixed ponderosa/lodgepole stands. The largest stands of ponderosa or ponderosa/lodgepole pine mix occur in the vicinity of La Pine State Park, adjacent to Paulina Prairie, northeast of Maston Butte, and west of Wagon Trail Ranch Subdivision. Ponderosa pine also occurs as individual trees widely scattered throughout much of the lodgepole pine type and has plant associations similar to those of lodgepole pine.

Historically, there was a greater percentage of larger and older ponderosa pine in the Planning Area. Past selective logging, intense stand competition, attacks by western pine beetle, and lightning strikes have reduced the number of these large, old trees, and as a result, the

distribution of this late-successional or old-growth ponderosa pine forest type is below the natural historic range of variation.

Riparian Vegetation

Because of their proximity to water, the plant species present in riparian areas often differ considerably from species found in the adjacent uplands; however, a functioning riparian zone provides fish and wildlife habitat, protects water quality, stabilizes stream banks, aids groundwater recharge, assists in flood control, and provides visual esthetics and recreational opportunities. Most of the riparian habitats on BLM-administered lands in the Planning Area are located along the Little Deschutes River, but there are some along Crescent Creek and a few along irrigation canals. These areas contain a complex mosaic of riparian habitats on broad flood plains, including broad meadow areas composed primarily of sedge, rush, and/or grass communities with scattered willows and other woody riparian species. Adjacent to the Little Deschutes River and its oxbows, there are dense willow communities interspersed with wet meadows encompassing a wide variety of emergent and flood tolerant species of vegetation.

There are an additional 2,124 acres of grass meadow habitats associated most often with 29 miles of river/creek riparian communities. Some of the grass-meadows have young lodgepole pine and ponderosa pine expanding into them which is changing the plant community from meadow to forest.

The riparian and meadow plant communities typically found adjacent to the Little Deschutes River are dominated by willow, bog birch, sedges, rushes, and grasses. Small areas in the floodplain and in the oxbow channels often have standing water for eight to nine months of the year. In the absence of fire, meadow edges are being encroached upon by lodgepole pine regeneration.

Woodland Products

Mechanical fuels and silvicultural treatments would provide an opportunity to harvest trees for wood products such as lumber, chips for composite products and paper, firewood, posts, poles, and biomass for energy. Harvest of trees would require ground-based equipment and would abide by the Best Management Practices and other guidelines provided in the vegetation, wildlife, hydrology, and soils sections. The Upper Deschutes RMP also specifies broad direction for harvest and utilization of forest and other specialty products. In addition, harvest of trees would generally be limited to a maximum diameter at breast height (DBH) of 16 inches. However, larger trees may be cut and/or removed if they pose a risk to life or property. Hazard trees generally occur adjacent to homes, roads, recreation sites, and other developed areas. These trees would be identified by the BLM and individually marked for removal.

In recent years, biomass has been heavily promoted, funded, and subsidized for harvest and utilization as a fuel source for renewable energy and other products. Forest biomass material is generally processed from the smallest trees (less than nine inches DBH) and from the waste material of other harvest operations. The use of biomass from projects in the La Pine Basin, and in WUI areas in general, is particularly attractive. Chipping/grinding and hauling of slash (branches, tops, bark, etc.) and small trees is one option for removing fuels without burning in populated areas. The La Pine area has the added benefit of good transportation and easy access to markets

(existing and proposed). Utilization of small trees and treatment residue from project areas may increase over time as the demand for green energy increases. Proposals for co-generation power, gasification, cellulosic ethanol, and other technologies that convert slash and waste wood into renewable power are currently being considered.

Special Status Plants

Four special status plants are known or would be suspected on BLM-administered land within the Planning Area: Estes artemesia (*Artemisia ludoviciana ssp. Estesii)*, Peck's milkvetch (*Astragalus peckii*), Pumice Grapefern (*Botrychium pumicola*) and green-tinged paintbrush (*Castilleja chlorotica*).

One site of Estes artemesia (Bureau Sensitive[7]) is known to be within a Project Area, located along the Little Deschutes River near La Pine. Monitoring in 2005 indicated the site was stable. Its habitat is generally wet during the winter and spring months, but becomes dry by summer. Often associated with riparian habitat, Estes artemesia serves to anchor the soil and provide some shade. Threats include trampling by recreationists and livestock, displacement by exotic species and any changes in the hydrologic regime.

Peck's milkvetch is also Bureau Sensitive species and only one site has been located within the Project Area; predominantly in a powerline right-of-way and along an associated road. This population was determined to be stable in 2005. Peck's milkvetch prefers somewhat open, flat basins characterized by deep, dry, loose Mazama pumice or ash soils. This early-seral, perennial member of the pea family occupies open, sunny sites in a coniferous (lodgepole pine) or shrub (big sagebrush-bitterbrush with western juniper) canopy. Peck's milkvetch is also listed as threatened by the State of Oregon.

Although it appears to tolerate and perhaps even require some level of disturbance, threats potentially include development of habitat, soil compaction/disturbance through livestock grazing and mechanical activities, and fire suppression, since fire tends to open up the canopy and reduce competition from other plants.

Pumice grape fern (Bureau Sensitive) occurs primarily on sites dominated by lodgepole pine. Approximately 20 sites are known to be on BLM-administered lands in the Planning Area, ranging in size from one plant to nearly 800. In general, it appears many sites have declined in numbers in recent years due to undetermined factors but potentially including weather patterns and changes in habitat. Research indicates that biomass removal and shading do not have a significant effect on plant emergence. Scraping, depending on the depth, and burial generally negatively affect plant emergence. The effect of compaction was directly correlated with the compactability of the soils, with emergence significantly less in soils with high compactability ratings (Amsberry and Meinke, 2003, Ahlenslager and Potash, 2005).

[7] Bureau sensitive species could easily become endangered or extinct. They are restricted in range and have natural or human-caused threats to survival. Agency policy requires that any Bureau action will not contribute to the need to list any of these species as threatened or endangered.

Green-tinged paintbrush, Bureau Sensitive and considered threatened throughout its range (ONHIC 2004), is most often associated with big sagebrush, but can also be found in association with antelope bitterbrush in ponderosa pine or lodgepole pine communities. Species occurrence is strongly associated with canopy gaps or open canopy conditions where understory light, water and nutrient availability are high. Although not documented on BLM-administered lands in the Planning Area, green-tinged paintbrush has been located nearby on lands managed by the Deschutes National Forest. The majority of populations have been documented south of the La Pine Basin on the Winema National Forest (USFS 2006).

Prescribed fire may enhance green-tinged paintbrush habitat, but survival of mature big sagebrush and bitterbrush, neither of which are fire resistant, requires appropriate timing and spatial arrangement of prescribed fire treatments for maintenance of the crucial relationship.

Noxious Weeds

Noxious weeds documented from the project area include diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), dalmation toadflax (*Linaria dalmatica*), Canada thistle (*Cirsium arvense*) and bull thistle (*Cirsium vulgare*). All are "B" classified weeds, which are weeds of economic importance and are regionally abundant, but which may have limited distribution in some counties.

Most of these weeds are located along the highways and major transportation routes, and Deschutes County has an active control program. None are particularly troublesome on BLM lands at the present time although bull thistle especially flourishes after forestry/fuels treatments. The pumice soils in the La Pine area are not as susceptible to noxious weed establishment as soils in the rest of the district.

Wildlife

Species of Focus

Several hundred wildlife species have the potential to occupy (feed and/or reproduce) the lodgepole, ponderosa and riparian habitats present in the proposed project area (Thomas et al. 1979) (For a complete Wildlife Specialist Report, see Appendix B). This analysis focuses on priority wildlife species called "Species of Focus" that are expected to be located in the planning area. Species of Focus are vertebrate species for which there is ongoing concern about population or habitat status. For this planning effort species were included if they met either of two criteria:

- Species that are included in the Special Status Species Policy (Special Status Plant Management BLM Manual - 6840) which includes: federally listed threatened, endangered, proposed or candidate species, Bureaus Sensitive, Assessment or Tracking Species and State listed species.
- Species of local interest, such as deer and elk.

Bald Eagle
Bald eagles (Threatened) are the only federally listed species in the planning area. Currently there are no bald eagle nests located on BLM-administered land in the Planning Area. However, there is one territory with two nest sites identified within one mile of proposed treatment units. Of these two nest sites, only one is currently active and is located within 0.22 miles of a proposed treatment unit. The other nest site was located within 0.24 miles of a proposed treatment unit, but the nest has not been located in over five years.

Bald eagle nesting territories are normally associated with lakes, reservoirs, or rivers. Nests are usually located in large conifers (e.g., ponderosa pine) in uneven-aged, multi-storied stands with old-growth components (Anthony et al. 1982) and unobstructed view of a water body. Live, mature trees with deformed tops are often selected for nesting. Bald eagles often construct several nests within a territory and alternate between them from year to year. Snags, trees with exposed lateral branches, or trees with dead tops are often present in nesting territories and are used for perching or as points of access to and from the nest. In the analysis area some of the old growth ponderosa pine could be considered suitable for bald eagles to nest in; however, bald eagles tend to nest within one mile of a significant water source and some of this habitat is located over one mile from a significant water source. Additionally, some of these trees are located where there is constant human activity (e.g., recreation in La Pine State Park), which may make them less desirable for eagles.

The main threats identified by the Bald Eagle Recovery Plan for the planning area are recreation disturbance, logging, shooting, and trapping. In addition, large potential nesting or roosting trees (e.g., ponderosa pine and Douglas-fir) have been significantly impacted by insect, disease, blow-down, wildfire, and timber harvest.

Oregon Spotted Frog
Oregon spotted frogs are a Federal Candidate Species that have only been documented in approximately 24 locations in Oregon. Associated with large wetland complexes, these frogs breed in shallow, relatively un-shaded emergent wetland ponds. After breeding, adults disperse into adjacent wetland and riparian habitats. Causes for the decline of the Oregon spotted frog, include loss of habitat from altered hydrology due to agriculture, urbanization and water development; predation by exotic fish and amphibians, and physiological effects from changes in water chemistry and ultraviolet radiation (Watson et al. 2000).

Areas of the Upper Deschutes Watershed (which includes the Planning Area) where Oregon spotted frogs have been observed include: Little Deschutes River, Crescent Creek, Long Prairie Creek, Paulina Lake, headwaters of the Deschutes River, Snowshoe Lakes, Crane Prairie Reservoir, Wickiup Reservoir, and the Deschutes River between the reservoirs, Little Cultus Lake Marsh, Big Marsh Creek, Odell Creek, and Davis Lake.

Mule Deer
The public has a high level of interest in mule deer for hunting and viewing (Wallmo 1981); however, in some suburban and agricultural areas, deer can cause problems when they feed in home gardens, and browse residential shrubs. Mule deer are present throughout the Planning Area both seasonally and year-round. The mule deer migration corridor in the Planning Area

receives use by 21,500 migrating mule deer annually. Mule deer descend from summer range on the eastern slopes of the Cascades to their lower elevation winter ranges. Use is concentrated in the area immediately south of Lava Butte near the La Pine State Park and between La Pine and Gilchrist. Mule deer populations are presently below ODFW management objective numbers.

Mule deer use dense ponderosa pine and lodgepole pine forests for cover while foraging in open woodlands and grass and shrub habitats. In the La Pine area 34,225 acres of BLM are allocated to be managed with a primary wildlife emphasis including considerations for mule deer. The northern and southern high use mule deer migration corridors are allocated to a primary wildlife emphasis.

Of the lodgepole pine and ponderosa pine communities that are on BLM-administered lands in the Planning Area, 16,204 acres (43 percent) currently provide suitable hiding cover conditions for mule deer in the migration corridor. This represents 43 percent of the BLM lands that grow forest conditions capable of providing hiding cover. In the northern high use corridor there are 1,012 acres (25 percent) and in the southern high use corridor there are 12,170 acres (45 percent) of hiding cover on BLM administered lands. A minimum cover to forage ratio of 30 to 70 was set in a Memorandum of Understanding with ODFW in 1990 to protect deer, and elk migratory habitat. Desired cover to forage ratios are documented at 40 to 60 by Thomas *et al.* (1979) and at 45 to 55 by Leckenby *et al.* (1982).

Rocky Mountain Elk

Elk can be found throughout the Planning Area in all vegetation types. Elk numbers have been increasing in the Planning Area during the past 10-12 years, and currently 150 to 200 elk reside in and around La Pine. These animals frequently move back and forth across U.S. Highway 97 to access the dependable water sources such as the Little Deschutes River, wet meadows, and springs on the west of the highway. Timber cutting in the Planning Area has created favorable cover to forage ratios encouraging the elk to stay in the area. Elk use the same corridors as deer in areas with sufficient connective habitat. Guidelines recommending a ratio of 40 percent hiding and thermal cover to 60 percent forage are have been widely accepted as optimal for elk (Toweill and Thomas, 2002).

In the Planning Area, BLM manages approximately 26 percent (28,873 acres) of elk winter range. Of this elk winter range, nine percent (2,560 acres) are managed with a primary wildlife emphasis (including guidelines for elk) and is located in the northern mule deer migration corridor. Of the 2,560 acres of BLM-managed elk winter range in the northern migration corridor, 32 percent (810 acres) currently provides suitable hiding cover and 68 percent (1,750 acres) is currently suitable foraging habitat. In the La Pine State Park there are an additional 2,296 acres of elk winter range, of which 78 percent (1,800 acres) is suitable cover and 22 percent (496 acres) is suitable foraging habitats. Most of the remaining elk winter range is located in the southern mule deer migration corridor, where elk is not a primary focus.

In general, ungulates respond to recreational activities by avoiding areas near roads, recreation trails and other types of human activities (Gaines, et al. 2003). To better quantify this relation, an elk-road density model was developed (Thomas et al. 1979, Lyon 1983) that has been used extensively throughout the intermountain west as a component of elk habitat effectiveness

models (Rowland et al. 2000). There are numerous types and quantities of motorized travel routes in the proposed project area. Many of these roads are improved travel routes and not under the jurisdiction of the BLM. Throughout the analysis area (including elk winter range and deer migration routes) habitat effectiveness on BLM-administered lands never scores above 22 percent and averages over seven miles of open roads per square mile of land.

Livestock Grazing/Range

There are thirteen grazing allotments in the Planning Area (See Table 3-2). Eleven have active grazing permits. There are a total of 17,203 acres of public grazing land within those permits, and 2,558 Animal Unit Months (AUMs). Ten of the permits are designated for grazing; two are available to become reserve forage allotments, if voluntarily relinquished, and one allotment could voluntarily discontinue grazing, or become a reserve forage allotment.

Grazing allotments in the Planning Area have a high amount of lodgepole pine. As described in the vegetation section, the stands of lodgepole are numerous and individual trees are compacted. The density of the stands prevents sunlight from reaching the forest floors. The trees also use an abundance of soil moisture and nutrients. As a result, grasses and forbs do not receive the amount of light nor water necessary to thrive, and the plant communities continue to be unbalanced.

In response to this lack of grasses and forbs and the density of lodgepole pine, grazing on the allotments in the Planning Area is being compromised. Lodgepole pine is not a preferred grazing plant for cattle, and the presence of desirable grazing plants such as grasses and forbs on a per acre basis is lower than expected due to the lack of light and available soil moisture. This scenario is perpetuated because the few remaining plants experience higher individual utilization. The plants become heavily grazed, suffer higher levels of stress from vegetative loss, and do not receive as much rest as they would if there was an abundance of forage material.

Table 3 – 2: Grazing Allotments

Allot #	Allotment Name	Acres	AUM's	Grazing Classification	Vacant (Y / N)
7502	A&L Sheep	6,027	1,012	G	Y
7504	Brown (La Pine)	552	93	G	N
7509	Cliff	1,185	88	R	N
7515	Helliwell	361	60	G	N
7552	Miltenberger (La Pine)	4,612	656	G	N
7554	Morgart	79	11	G	N
7559	Poole	1,373	180	G	N
7574	Kellems	196	34	G	Y
7575	Stearns	425	73	G	N
7586	Yager	344	33	R	N
7594	LeBeau	26	6	G	N
7595	Finley	1,304	72	G	N
7597	Long Prairie	719	240	*/R	N

A**UMs**: represent livestock active preference forage allocation

Grazing Classification

G Open for livestock grazing (entire allotment) under direction in this alternative.

R Possible reserve forage allotment (RFA) if the permit is voluntarily relinquished.

*/R Possible livestock grazing discontinued or RFA if the permit is voluntarily relinquished.

Hydrology

Average annual flows on the Little Deschutes River are approximately 208 cubic feet per second (cfs), with most of the flow occurring from March through August (Moffatt et al. 1990) (For a complete Hydrology Specialist Report, See Appendix C). Sustained flows through the summer months are due to regulation by Crescent Lake since 1922. Numerous water diversions upstream from the gage site reduce the amount of flow recorded at the gage. Withdrawal of water from the Little Deschutes River at a maximum rate of 37.5 cfs occurs at the Walker Basin canal near La Pine (RM 56).

The Little Deschutes River in the Planning Area is classified as an E-type channel that is relatively sinuous and narrow and deep (Rosgen 1996). Due to the wide floodplain and the good condition of the riparian vegetation, the segments of the Little Deschutes River that flow through public land have the ability to disperse energy during high flows and store water within its floodplain.

The headwaters of the Deschutes River originate from large springs which provide clear, cold water with a very stable hydrologic regime. However, as a result of water storage and diversion for irrigation, the stable flows have been replaced by lower flows during the winter storage months and higher flows during the summer irrigation season. This difference is most significant between Wickiup Dam and Fall River (USDA Forest Service and Oregon Parks and Recreation, July 1996). The regulation of flow contributes to accelerated erosion, decreases in wildlife habitat, decreases in scenic quality during the winter, and degradation of fish habitat. As a result,

the Deschutes River is classified as a wide and shallow F-type channel (Rosgen 1996) that is deeply carved into an alluvial valley.

Riparian vegetation along the Deschutes River is a combination of lodgepole pine and ponderosa pine; shrubs including spiraea, snowberry, alder, or willow; and forbs and sedges. There are several large willow/sedge meadows scattered within the reaches. Regulation of water from Wickiup has resulted in reduced riparian type vegetation on the outside of meander bends and increased widths of point bars on the inside of meander bends (USDA Forest Service and Oregon Parks and Recreation, July 1996).

Water Quality

Both the Upper Deschutes and Little Deschutes Rivers are considered water quality limited and are on the 2002 Oregon Department of Environmental Quality 303(d) stream list[8]. Table 3-3 below shows the parameter and management concerns for which each stream is listed.

Table 3-3: 303(d) Listed Water Bodies and Parameters

Waterbody	303(d) Listed Parameters	Area of impact
Upper Deschutes River	Within Vicinity of Project Area: Dissolved oxygen levels insufficient; Sedimentation, Turbidity, and stream temperature (17.8 degrees Celsius). ---------- Downstream of Project Area: Chlorophyll a (Chl*a*), Dissolved oxygen, Stream temperature, Sedimentation, Turbidity	• Water quality limited for dissolved oxygen, sedimentation, and turbidity from Wickiup Reservoir to the confluence with the Little Deschutes • Within and adjacent to the project area, the river does not meet the dissolved oxygen standard for salmon and trout spawning ---------- • water quality limited for turbidity, temperature, sedimentation, dissolved oxygen, and chlorophyll a (Chl*a*)
Little Deschutes River	Dissolved oxygen and stream temperature (17.8 deg C)	Does not meet the dissolved oxygen standard for fish spawning and rearing. Upstream from the project area, the river does not meet the temperature standard for trout rearing and migration and for spawning from September 1 – June 30

[8] According to the draft Water Quality Restoration Plan (USDA FS and USDI BLM, 2004), flow regulation is the most important management action affecting width to depth ratios and channel formation within the Upper Deschutes and Little Deschutes subbasins. Release schedules have scoured sections below the dam and have caused aggradation further down. Increased discharge can increase channel widths, increasing width to depth ratios, exposing more surface area to insolation, which contributes to increasing water temperatures.
.

In the Little Deschutes subbasin, Crescent Lake has 86,050 acre-ft permitted storage on top of a natural lake and Paulina Lake is permitted 19,460 acre-ft of storage over a natural lake. Mid-summer base flows within Crescent Creek are supplemented by irrigation releases from Crescent Lake for distribution of water to lands north of Bend by Tumalo Irrigation District. Diversions on private lands remove most of the routed discharge precluding connection with the Little Deschutes River during summer months. Crescent Creek routs discharges above the natural summer flow regime.

Wild and Scenic Rivers and State Scenic Waterways

The Upper Deschutes River is a federally designated Wild and Scenic River, and a State Scenic Waterway. The project area falls within Segments 2 and 3 of the Wild and Scenic River, which is classified as Recreational, and within Scenic and River Community Areas classifications for the State Scenic Waterway. Outstandingly Remarkable Values (ORVs) for Segments 2 and/or 3 of the Wild and Scenic River include: geologic, fishery, vegetation, wildlife, cultural, scenic, and recreation.

The Little Deschutes River has a 12-mile segment designated as Wild and Scenic located approximately 25 miles upstream of the project area.

Fisheries

Habitat Conditions

On BLM-managed lands in the Planning Area, fisheries habitat conditions are in good to excellent condition with adequate instream cover, healthy riparian areas, and moderate water temperatures to support cold water fish.

Fish Species and Populations

Fish species currently in the Little Deschutes River and Crescent Creek are redband trout, brown and brook trout (introduced), mountain whitefish, and sculpin (See Table 3-4). Reasons for the current low numbers of redband and brown trout are unknown at this time, but may be attributed to the high infestations of nematodes found in these fish.

Table 3-4: Fish Species Present

Redband Trout (State Sensitve)	*Oncorhynchus mykiss*
Brown Trout	*Salmo trutta*
Brook Trout	*Salvelinus fontinalis*
Mountain Whitefish	*Prosopium williamsoni*
Sculpin	*Cotus spp.*

Soils

The Planning Area, located within the Pumice Plateau Basins ecoregion, is a broad basin between the Cascade range and Newberry Volcano. Slopes are generally less than five percent, with a coarse, Mt Mazama, pumiceous ash mantle of varying thickness overlying older alluvial and lacustrine deposits. The primary named soil series found in the project area, listed in order

from driest to wettest, are: Lapine, Steiger, Shanahan, Sunriver, Tutni, and Cryaquolls (For a complete Soils Specialist Report, See Appendix D).

Past Management

The soil resource within the Planning Area has been disturbed to varying degrees by past management. Between 1970 and 1992 beetle-killed lodgepole pine was salvaged under 14 various timber sales administered by the Bureau of Land Management. Harvesting using mechanical feller bunchers caused detrimental damage to the soil resource in the form of compacted skid trails and landings and variable amounts of compaction between skid trails as a result of field conditions during the operations. Field and aerial photo reconnaissance determined that detrimental compaction comprised 15 to 20 percent of these entry areas with distinct skid trails and landings present. Displacement of surface organics and mineral soil does not appear to be significant across the area.

Limitations

Fertility of the soils in the Planning Area is naturally low and maintaining an intact topsoil layer is important for providing stability and nutrient exchange. In order to minimize wind erosion and maintain soil productivity, disturbance should be limited. All of the soil series present within the project area are susceptible to severe frost damage and frost heave. Frost heaving occurs when soil expands and contracts due to freezing and thawing. This process can damage plant roots and displace large amounts of soil.

The 2005 Upper Deschutes RMP and Record of Decision, provides management direction to:

- Maintain and restore healthy, diverse and productive native plant communities appropriate to local site conditions.
- Manage vegetation structure, density, species composition, patch size, pattern, and distribution to reduce the occurrence of uncharacteristically large and severe disturbances.
- Maintain or mimic natural disturbance regimes so that plant communities are resilient following periodic outbreaks of insects, disease and wildland fire.
- Identify opportunities to actively re-pattern vegetation on the landscape to conditions more consistent with landform, climate, biological, and physical components of the ecosystem, and considering social expectations and changes to the landscape driven by human influences.

Cultural

The Planning Area is nestled between Newberry Crater and the Paulina Mountains to the east and upland lakes country of the Deschutes River drainage to the west. This area is generally characterized by relatively flat terrain that increases in elevation to the west, south and east and is punctuated around its edges by cinder cones and buttes of volcanic origins. The area takes in a small portion of the Deschutes and Fall Rivers drainages and a larger portion of the Little Deschutes River drainage (mostly east of the river). Elevations within the study area range upwards from 4000 feet above sea level.

Prehistory

The Native American history of the area is primarily understood through the archaeological record. The earliest evidence for human use or occupation comes from sites in Newberry Crater to the east and from sites around upland lakes west of the study area. The evidence indicates that humans were using these areas as early as 8000-10000 years ago (Connolly et al. 1999). The eruption of Mt. Mazama 7000 years ago dumped ash feet thick over the entire area. This ash layer potentially has covered many earlier sites and created an apparent break in human occupation in the area. Thousands of years later (after 4500 years ago), the area exhibits occupation and use once again. Land use changed over this transition period from one which was more sedentary and where many resources were available and exploited, to one more mobile in which primarily one resource (obsidian) was utilized. Travel, primarily north-to-south, but possibly east-to-west, most likely continued to play an important role throughout this period of time. The Klamath Trail which passes north-south through the study area was a major travel route used by Native Americans between the Klamath lakes and The Dalles. Ethnographic information from the study area is rare. Journal entries from early fur trappers reveal that in November and December native Indians (reportedly Walla Walla and Snake) were reported camped in the vicinity of the study area. One entry reports the Indians hunting and drying deer meat.

History

Euro-American history of the Planning Area begins in 1826 with the fur trapping expedition of Peter Skene Ogden of the Hudson Bay Fur Company when he crossed from east to west near the northern end. They established a camp on the Little Deschutes River and reported encountering Snake Indians. Several additional trappers subsequently made their way through the area, and in 1864 the Huntington Road, linking The Dalles with the Klamath Lakes area, was created in 1864 and apparently followed an earlier Indian created route.

Until the 1870's, the Planning Area was also used by Willamette Valley ranchers driving livestock (mostly cattle and sheep) either to summer pasture in the meadows (e.g., Long Prairie) lining the Deschutes and Little Deschutes Rivers, farther east to supply Oregon and Idaho mines, or to eastern railheads for shipment by rail to eastern markets (Oliphant 1968). The majority of land filings occurred in the late 1880s and 1890s, and ranches began to be established. Once the railroad was completed in the early part of the 20th century, timber resources were able to be exported to outside markets. The railroad line from the Columbia River was completed to Bend in 1911. Soon after, several large eastern timber companies relocated in Bend and began harvesting the vast timber resources claimed earlier through land laws, specifically the Timber and Stone Act. The areas harvested were mostly south and east of Bend, and probably included the Planning Area. Railroad logging was used extensively in the early years of the companies, but soon switched to truck logging. The mills worked these areas for forty years, between 1920 and 1960.

Tourism in the Planning Area began in the early 1900's. Fish were planted in the lakes of Newberry Crater and a resort was established there as well. Natural lakes in the Cascades were also popular for Bend residents and other tourists. After World War II, the Cascades lakes became a favorite vacation area for many. The popularity of the area has grown ever since and

the development of Sunriver has added to the population of the area, particularly in the non-winter months. Fishing in the Deschutes, Little Deschutes and Fall Rivers is an added attraction.

For the past 25 years, the BLM has conducted a variety of inventories within the project area. Approximately 50 percent of the entire area has had intensive or sampling inventory performed. Site types observed or recorded include prehistoric lithic scatters or isolated artifacts, historic isolates, sites related to historic logging practices, homesteads, and historic wagon roads. Much of the La Pine area has experienced logging activities at least once and probably multiple times over the past 80 years. The thick ashy soils that cover most of the project area have buried and protected much earlier prehistoric sites. The majority of prehistoric sites are related to middle and late (later than 4000 years ago) Archaic cultural periods. Although the project area exhibits early historic use, that use did not leave much physical evidence. In fact, La Pine's history begins in the late 1880's, but it didn't really take off until after 1910, with the arrival of the railroad and timber industry of the early twentieth century.

Recreation

The Planning Area attracts the public for water-based recreation opportunities such as rafting, boating, fishing, hunting, wildlife observation, and swimming as well as land-based activities such as golfing biking and mountain biking, hiking, camping , hunting, photography, trail running, horseback riding and walking. Recreation based activities contribute to the economy of Deschutes County. Sandy pumice soils, few rocks, mostly flat with undulating land in small rises provide for easy access to BLM-administered lands in the project area resulting in numerous and unregulated user created roads and trails from major highways, state and county roadways and from neighborhoods and private residences. The Deschutes River offers recreational opportunities unique enough to attract visitors from outside the geographic region. Visitors are willing to travel long distances to use river resources for recreational purposes. In winter, Mount Bachelor Ski Resort and public lands and snow-parks in the higher peaks draw recreational users.

Motorized Recreation

Motorized Recreation use in the Planning Area is composed primarily of dispersed motorized use year round. In winter, motorized use of the area generally consists of snowmobiling. Old logging roads provide travel-ways and open land features such as wet meadows, pumice flats and clear cuts provide additional winter play opportunities close to residences. Down trees and shrub cover are covered with snowfall. In spring, summer and fall, use consists of 4-wheel drive vehicles, OHV's and motorcycles primarily on existing and user created roads and trails. There is currently only one designated motorized use area with trails in the project area (Rosland OHV Play Area), otherwise there are no other designated motorized routes or trails in the Planning Area on BLM-administered lands. The trails associated with the Rosland Play Area access additional motorized use areas on Forest Service lands to the east. Anecdotal evidence shows that local residents use many of these existing dirt roads or utility rights-of-way on BLM administered lands as shortcuts to major highways or into town from their neighborhoods. In particular, people use the power line ROW crossing Highway 31, and the gas pipeline crossing Finely Butte Road.

Non-Motorized

Non-motorized recreation use on BLM-administered lands in the Planning Area is dispersed with no BLM-managed trailheads. La Pine State Park and Newberry National Volcanic Monument offer the only managed non-motorized trails. Public access to BLM lands is casual, off paved local, county or state roadways. In winter, cross-country skiing, snow shoeing, hunting occur primarily from adjacent private property. There are no snow-parks plowed or maintained access areas In spring, summer and fall hiking, mountain biking, horseback riding and carriage driving, hunting, wildlife viewing, canoeing and fishing occur primarily using existing and user created roads and trails in the project area. Due to thick vegetation and dead and down timber, off road or trail travel is limited. There are no designated non-motorized roads or trails in the Planning Area. Rosland Campground along the little Deschutes River and the newly purchased 480 acres of the Little Deschutes Exchange parcel are areas identified as Highly Sensitive Visual Quality. Both parcels have user created trails, user created fishing and boating access, open vistas of higher visual quality and ecological value than other parcels in the project area.

Management Direction

The recently signed Upper Deschutes Resource Management plan identifies the need for designated routes for motorized and non-motorized recreation and travel /transportation management in La Pine. The plan identified Motorized use in the northern 1/3 of the project area near La Pine State Park as non-motorized emphasis, designated roads for motorized use and trails for non-motorized use only (p. 120, UDRMP, ROD). If opportunities for non-motorized trail connections exist, development of non-motorized trails in the northern portion would be considered. The southern 2/3 of the project area has a recreation emphasis and limits motorized use to designated roads only. The Little Deschutes River parcel would be managed for non-motorized recreation with an emphasis on hiking trails.

The Upper Deschutes Resource Management Plan designates the Planning Area as falling within the High Desert Special Recreation Management Area – La Pine Recreation Area. This Resource Management plan calls for the following:

- Increase of size Rosland OHV pit and improve connections to riding trails on the FS East Fort Rock Riding area as well as road open to OHV use on FS
- Designation of Motorized routes and closure areas
- La Opine Area limited to designated roads and trails for motorized
- WSR Corridor Closed to motorized per Upper Deschutes WSR Plan.
- All ROW currently open would remain open
- Isolated parcels in the North portions of the project area closed to shooting and all firearm use (vicinity of La Pine State Park)
- Isolated parcels in southern La Pine and project area are closed to shooting unless legally hunting.

Visual Resource Management

Visual characteristics of the landscape in the Planning Area come from some natural meadows and openings with some expanse of view of the Cascade Range to the West, East Fort Rock and Newberry Volcanic National Monument as well as the river corridors of the Upper Deschutes Wild and Scenic River and the Little Deschutes River.

The scenic value of the Deschutes River is primarily within the foreground landscape as viewed from the river, trails along the river and access roads and bridges to the river. The diverse changes of the Deschutes River make it unique as it flows through a variety of landforms and geographic features, many flowering and other riparian plant species, rigged lava flows, rim rock, and abundant wildlife such as eagle and osprey as well as furbearers and larger mammals. Mature stands of ponderosa pine visible form the river and access roads create and important element of the viewing experience on the river.

The Visual Resource Management guidelines specify that all of La Pine is in VRM Class III and IV with the exception of the Upper Deschutes Wild and Scenic River Corridor. The Upper Deschutes RMP also established sensitivity levels for the Upper Deschutes Planning Area under the following criteria. The Planning Area included < 10 acres (estimate) of BLM-administered public lands and private lands within the Upper Deschutes Wild and Scenic River protected corridor and along the segments 2B and 3A within La Pine State Park (where BLM manages the vegetative cover) and adjacent to Forest Service administered public lands. Some land features such as wet meadows, clear cuts and game trails provide some visual contrast but the terrain is generally flat and sandy, heavily grown with lodgepole regeneration and limited openings from clear cuts or wet meadows or pumice flats. At some of these natural or man made openings there is transparency of the forest allowing for views of backdrop peaks of the Cascade Range or Paulina Peak within Newberry National Volcanic Monument. The river corridors provide openings and sinuosity to an otherwise flat and static visual element.

Design of the action alternatives primarily focuses on how best to move toward meeting the desired area vegetation/fuels condition while meeting VRM class III and IV guidelines. Management activities in highly visible landforms that form a community backdrop would not be evident. In these areas, vegetation management would only be approved if it protects or improves visual quality.

The desired future condition along the Greater La Pine Fuels Reduction Project area, Newberry National Volcanic Monument and the Upper Deschutes WSR corridor is a mosaic of vegetation that maintains the river's Outstanding Remarkable Values. ORV's are those values, which caused the river to be designated as a component of the national wild and scenic river system. For the Upper Deschutes River and Fall River, they are the fisheries, diverse recreational opportunities and natural scenic qualities.

Air Quality

Any proposed prescribed burning activity occurring in the Project Area would be conducted in compliance with the National Ambient Air quality Standards and Oregon Department of Oregon Environmental Quality regulation and restrictions and Oregon Department of Forestry State Smoke Implementation Plan. The National Ambient Air quality Standards have been developed

to identify and monitor total suspended particulates (solid material contained in smoke) and carbon monoxide (CO). Particulate Matter (PM) 10 is a particulate matter that measures 10 micrometers in diameter or less. PM 2.5 is a particulate matter that measures 2.5 micrometers or less. Emissions produced by prescribed fire activities are capable of reducing overall visibility and the absorption of harmful surface gases. Throughout central Oregon, the Forest Service, Oregon Department of Forestry, Bureau of Land Management and private land owners contribute annually emissions into the airshed; however, wildfire has produced 99 percent of the emissions from the Planning Area during the last 5 years.

Table 3-5. Emissions Produced in the Project Area within the Last 5 Years.*

Fire Type	Acres Burned	PM10 (tons)	PM 2.5 (tons)	CO (tons)
Hand Pile	230	1.04	.90	N/A
Wildfire	100	776.06	756.29	199.46
Total	330	777.1	757.19	199.46

*A Modification and Validation of Fuel Consumption Model (CONSUME) was used to determine particulate emissions from activities in the project area.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Critical elements

The following critical elements were considered, but would not be addressed because they would either not be affected or do not exist in the project area:

1. Agricultural Land, Prime or Unique
2. Areas of Critical Environmental Concern
3. Energy resources and Transmission
4. Environmental Justice
5. Farmlands, Prime or Unique
6. Native American Religious Concerns
7. Research Natural Areas
8. Wastes (hazard or solid)
9. Wilderness (including wilderness study areas)

4.2 Environmental Effects

Fire/Fuels

Approximately 40 percent (14,000 acres) of the Planning Area is defined as having potentially hazardous fuels. This is determined by analyzing surface fuel loading and crown bulk density. The proposed action would increase the percent of land within the Planning Area that has reduced surface fuel loadings and minimized crown fire potential. These changes are a result of the reduction in stand density and surface fuel loadings.

The scale and effectiveness of the treatments would vary according to the prescription category in the proposed action. Proposed treatments may lesson the probability—to varying degrees—of a stand destroying fire occurring in the project area and extending into the communities at risk.

Table 4-1: Current fuel model, fire behavior and effect of proposed action on the overall percentage of the treatment area that is considered hazardous

Fuel Model	Predicted Fire Behavior	Percent of Fuel Model in Planning Area (%)	Amount to change under proposed action (%)	Percent change to existing condition
FM 1	surface fire	10	10	No change
FM 6	surface fire	50	50	No change
FM 8	crown fire potential	28	19	-70
FM 11	crown fire potential	12	11	-90

Vegetation

The description of effects on vegetation in this section will focus on the two major treatment methods in the proposed action: mechanical and prescribed fire.

Effects of Mechanical Operations

Mechanical operations would be the most common treatment method on most vegetative types. The equipment used, regardless of the specific equipment type, or the specific treatment activity, would produce substantial direct effects on vegetation. The degree and extent of these effects would vary, based on equipment type, size, attachments, and resource objectives. Direct effects would include damage/reduction/alteration by equipment operation. Much of the direct mechanical effects to vegetation would be intentionally directed at target vegetation to achieve fuels reduction, piling, harvesting or some other treatment objective. Some unintended damage to residual or non-target vegetation could also occur. Equipment designed to work around leave trees, such as slash busters, feller-bunchers, and skidders, can crush understory vegetation, break branches and tops and damage stems of residual trees. Damage to desirable leave vegetation could be reduced by close monitoring of operations and use of the proper type and size of equipment for the prescribed treatment.

Mechanical removal of trees, shrubs, logs and organic matter would produce ecological changes in both plant and animal communities. Generally, mechanical treatments that remove these components tend to change the seral stage of the plant community from a later stage to an earlier stage. Most mechanical treatments would be designed achieve silvicultural/ecological benefits in addition to fuels reduction for fire protection.

Effects of Silvicultural Treatments

This section will focus on ecological effects of just the two most common silvicultural prescriptions implemented by mechanical means – thinning and patch cuts. Effects of silvicultural treatments on the most pervasive insects and disease in the La Pine Basin will also be discussed.

Thinning

The predominant silvicultural treatment within lodgepole and ponderosa pine stands would be thinning (cutting and/or removing only a portion of the stand). Thinning of stands in the La Pine Basin would be prescribed to achieve four main objectives:

- Reduction of ladder fuels and crown bulk density for effective fuel breaks adjacent to residential areas, main roads, and other developments.
- Restoration of ponderosa pine stands toward a more historic condition, composition, and structure.
- Management of lodgepole pine to control insects and disease and to restore overall stand health and vigor.
- Enhancement of wildlife habitat for species that depend on larger, older trees in a more open stand structure.

Thinning removes surplus trees (surplus as defined by whatever treatment objectives are applied) that compete for space, sunlight, water and nutrients. After thinning, these newly available resources are then reallocated to the fewer remaining trees in the stand. Resulting growth, in both height and diameter, would increase dramatically; two to four times greater than pre-treatment. Thinning would generally target the smaller suppressed trees and trees infected with insects or disease. The remaining trees in the stand would generally be those with the greatest vigor and least amount of disease. Improved stand health would increase long-term productivity and resistance to insect and disease attack.

Understory vegetation, particularly bunchgrasses, forbs, and bitterbrush would respond with much greater vigor and density for several years following the treatment. Over a period of decades, as the trees respond to the thinning by gradually increasing in growth and canopy closure, the understory vegetation would begin to diminish toward pre-treatment levels once again.

Ponderosa Pine Restoration

Ponderosa pine restoration would also have an intensive thinning prescription applied. Generally, a high percentage of the competing lodgepole pine would be removed to allow ponderosa pine to emerge as dominant within stands, and to allow the species to expand its range. In addition, a lighter thinning would be applied to the ponderosa understory and intermediate trees to provide a more open stand condition and allow bigger trees to develop over time. The ponderosa pine type stand edge would be treated to limit lodgepole seeding and promote ponderosa pine seeding. All seral stages of ponderosa pine would be allowed to develop, scattered across the La Pine Basin on appropriate sites. In areas with just a few scattered ponderosa pine within a lodgepole pine stand type, there would be a 50-foot commercial radius thin and a 30-foot pre-commercial radius thin applied.

Old-growth Ponderosa Pine

Old-growth ponderosa pine would be maintained by thinning and prescribed fire to simulate natural historic processes. Prescribed fire would be applied carefully to maintain large snags, down logs, and limit fire mortality to just the lodgepole pine and small ponderosa pine. Other areas with mature and intermediate overstory trees would be treated with a series of thinnings over time to develop old-growth stand characteristics. Restoration of larger stands and healthier old forest structure in ponderosa pine would be accomplished incrementally over a period of many decades. As competing lodgepole pine and smaller ponderosa pine are thinned out, the remaining ponderosa pine would respond with accelerated growth. Large diameter trees would be the first component of old forest structure to be restored. Large snags, down logs, tree bole decay, multiple canopy levels, and other more complex physical attributes and processes of an old forest would take much longer to develop. Each treatment entry would be designed to incrementally work toward restoration of ponderosa pine ecosystems that are more representative of those which occurred historically. A high level of snags and down logs are not generally representative of historic conditions in ponderosa pine, but would be retained or developed to provide additional diverse wildlife habitat.

Patch Cuts
In some areas in the Project Area, "patch cuts" would be prescribed to produce stand openings ranging in size from 1/4 to 5 acres. Silviculturally, the openings are more properly termed "group selection." The openings would be in various shapes with irregular boundaries. The extent of effects would generally be proportional to the size, number, and total acreage of this type of treatment. Small patch cuts would remove all, or nearly all, of the forest tree component, with the objectives of developing a new size and age class, future wildlife cover, and healthier patches of trees over time. Due to the amount of existing even-aged lodgepole pine treatments that have occurred in the last 20 years, this prescription strategy would be used sparingly and introduced gradually over a long period of time. This prescription would usually be applied in three situations:

- Where lodgepole pine stands are suppressed and/or severely infected with disease, making them unmanageable with thinning.
- Where expansive stands of interior even-aged lodgepole pine occur, providing conditions conducive to bark beetle attack or wildfire.
- Where horizontal and/or vertical wildlife habitat diversity is lacking.

Patch cutting, by design, produces substantial local changes in plant community structure and composition. By nearly total removal of trees, and from the ground disturbance of operations, plant communities would revert back to an earlier successional stage. When overstory trees are removed, competition is greatly reduced for sunlight, nutrients, water and growing space. These resources are then available to the understory vegetation and the next generation of trees. Early seral stage species would colonize and increase, while species preferring shade or later seral species would decrease. First, grasses and forbs would increase in relative abundance, followed by shrubs. Finally, through natural regeneration from the adjacent stand, lodgepole pine would regain dominance over the site over a period of 10-15 years. With a sequence of patch cuts over a long period of time, the forest would develop a mosaic of small stands with varying ages, canopy levels, and successional stages. The stand structure of the residual older stands in-between the patch cuts would also contain much diversity and complexity with variable tree densities, multiple canopy levels, uneven-aged trees, and abundant snags and down logs.

The above description of patch cuts would likely be modified in some areas, where appropriate. In order to increase diversity further, and promote more rapid natural regeneration, a few healthy seed trees, wildlife habitat trees/snags, and down logs would be left within patch cut units. Where healthy ponderosa pine is present, these would be retained to serve as seed trees.

Effects of Prescribed Fire
Prescribed fire in the proposed action includes pile burning, broadcast burning, jackpot burning, and underburning. Site-specific prescriptions would be written that identify burn objectives and the parameters within which the burning would occur. Some of these parameters are fuel moisture, wind velocity and direction, relative humidity, and future expected weather conditions. Prescribed burning would be done for reduction of natural and activity fuels, restoring proper ecological and hydrologic function, changing vegetative structure or composition, and site-preparation for planting or seeding.

Effects of prescribed fire on vegetation in the Project Area include:

- Change in seral stage from later to earlier stages. Immediate reductions in the total amount of vegetation, followed by rapid re-growth increases in density and vigor of vegetation, especially grasses and forbs. Species composition and proportions may change in the long term. Re-colonization begins with a high proportion of herbaceous species. Later, over a period of years, woody species (shrubs and trees) emerge as increasingly dominant through the process of succession.
- Reduction of some fire intolerant species and increases of some fire-tolerant or fire-dependant species. Lodgepole pine and bottlebrush squirreltail respond favorably following fire.
- Changes in nutritional and physical characteristics of the soil and corresponding effects on plant growth due to a potential nutrient "flush," particularly phosphorus and potassium. Long-term net losses of nitrogen and organic matter may occur with fire.
- Occasionally, particularly in treatment band 3, fire would be prescribed in dense lodgepole pine stands to break up fuel continuity and to promote habitat diversity. This prescription requires a relatively intense burn with the goal of killing all, or a high percentage, of the trees on a small area (1/4 to 5 acres in size).

Ponderosa pine has evolved with frequent fire as a natural component of its environment. This fire-adapted species can thrive in a well-managed prescribed fire program. Prescribed fire can thin emergent seedlings and saplings, control brush, and prune larger trees. Growth of residual trees would accelerate within a few years with a reduction in competition. Understory grass and forb density and diversity would be greatly enhanced following light underburning. Idaho fescue, bottlebrush squirreltail, and antelope bitterbrush on many sites would respond well within 2-3 years after fire.

Riparian/meadow habitats exist adjacent to the Upper Deschutes and Little Deschutes Rivers, Crescent Creek, irrigation ditches, and in stringer meadows interspersed throughout the La Pine Basin. Reintroducing fire into these habitats would restore the hydrologic and ecologic function of these sites by controlling small lodgepole pine and by creating micro-site changes favoring the regeneration of a greater diversity of sedges, rushes, forbs, and woody riparian species.

Effects on Insect and Disease

Management of forest insects and disease would occur primarily through silvicultural prescriptions designed to alter vegetative condition to favor ecosystem health. Thinning and patch cutting would improve stand health immediately and directly by removing infected and vulnerable trees. Thinning would retain the healthiest and most vigorous trees which are resistant to insects and disease. Insects and disease would rarely be totally eliminated from the forest. In fact, total eradication of native tree-damaging insects and disease would not be a realistic goal, or even a desirable outcome, as these organisms evolved with the forest community and are an integral part of ecosystem function. Treatments for insects and disease would be prescribed to control outbreaks and reduce infections to endemic levels. Endemic populations of these organisms, under more natural conditions, would normally cause light mortality in individual and small groups of trees. Insect populations would fluctuate up and down and disease occurrence

would expand and contract based on environmental/climatic factors. However, large outbreaks or epidemic populations would be prevented or controlled through management practices. The insects and diseases of most consequence within the planning area are: dwarf mistletoe, western gall rust, various root and stem diseases and bark beetles.

Dwarf Mistletoe

In stands where the occurrence of dwarf mistletoe is low, thinning and salvage treatments would treat a high percentage of this parasite by removing infected host trees. Thinning can also limit the spread of dwarf mistletoe horizontally by increasing the tree-to-tree spacing to a wider distance than the dissemination range of the mistletoe seed. Thinning is also effective in limiting vertical spread by greatly increasing tree growth, which enables trees to grow in height at a rate faster than mistletoe can spread upward vertically. While infection rate could actually increase through improper use of thinning in multi-story stands, this situation can be avoided by prescribing an even-aged treatment in heavily infected stands. Large patch cuts and initiating a new stand would be the most effective means of controlling the most severe dwarf mistletoe infections.

Western Gall Rust and Root Diseases

Thinning and salvage treatments reduce these diseases by removing infected host trees. Mechanical thinning operations, however, result in some damage to the roots, stem, and branches of residual trees, and may allow infection from airborne spores. Specialized equipment, designated skid trails and strict adherence to contract specifications would limit this damage.

Bark Beetles

Thinning for density management would provide the greatest benefit in managing bark beetle population levels. The mountain pine beetle favors large, contiguous, dense stands of low vigor trees with a minimum tree diameter of 6 inches. Thinning would alter stand conditions by removing the weak and low vigor trees and increasing the overall health of the remaining stand. Healthy trees are able to repel most low density beetle attacks. Patch cutting would break up large stands and introduce horizontal diversity, which would reduce the conditions conducive to a large-scale beetle outbreak.

Special Status Plants

Any special status plants located during project survey would be protected by the provisions of the Best Management Practices. However, should plants not be detected and therefore inadvertently subjected to treatment, impacts would likely occur.

In general, the proposed treatments would result in five categories of impacts affecting special status plants: gross overstory removal, complete overstory removal, soil disturbance, prescribed fire effects and debris:

- Gross overstory removal would be the result of removing large diameter plant material as part of pre-commercial thinning or harvesting. The canopy would be opened or removed, changing the site characteristics, including radiation and available soil moisture.
- Complete overstory removal, as through mowing or prescribed fire, would completely remove the shrubby overstory, resulting in a grass/herb-dominated site with increased

radiation. In the long-term, an increase in competing vegetation could negate any short-term gains in available soil moisture.

- Soil disturbance would result from the use of any wheeled or tracked equipment on site, and could occur with all treatments. Effects include soil compaction, soil displacement and site-specific crushing or killing of vegetation.
- Along with a change in vegetative overstory, as through pre-commercial thinning, harvest or mowing, prescribed fire could kill non-target herbaceous species through actual burning of live plant material or through associated soil heating. This effect would be heightened in areas where debris piles are burned.
- Effects of debris disposition would vary depending on the method used. Debris left on the soil surface would bury plants and the intensity of effect would vary with the size of the debris left on site. Debris piled and then burned would result in soil heating and loss of plants on site.

Specifically, *Artemisia ludoviciana ssp. estesii* could likely be affected by mowing, or prescribed fire, utilized for meadow restoration. It is unlikely other treatments would occur in suitable habitat.

Since *Artemisia ludoviciana ssp. estesii* is a clonal species, and can contain up to 65,000 stems in a 300 square foot plot (Brounstein, 1997), it would be expected to respond similar to the genus *Carex* (sedge), in that low to medium intensity fires (and probably mowing) generally have no effect. Fire is usually non-lethal to below-ground plant parts allowing species that sprout to recover rapidly. However, it is lethal if some of the aboveground grasses and sedges are living and are killed by fire (Brown, 2000). Work by Gucker (2005) noted a decrease in density of *Artemisia ludoviciana* as a result of spring and summer burning.

Astragalus peckii would likely be susceptible to the effects of soil disturbance and debris treatments. As stated earlier, specific data related to its response to disturbance does not exist, but based on observations, some soil disturbance would not likely be harmful. Long-term covering by debris would likely result in localized extirpation. A reduction in the overstory would likely be beneficial. Preliminary results of the disturbance ecology study (Amsberry, 2006) indicate an increase in density of *Astragalus peckii* as a result of prescribed fire. Burning of debris piles would likely kill plants on site. Opening of the canopy would likely be beneficial.

As discussed earlier, *Botrychium pumicola* would be particularly susceptible to treatments which caused soil disturbance and/or debris disposal resulting in a covering of the soil surface. Plants thus impacted would likely become extirpated and reproduction of surviving plants would be reduced. Prescribed fire and overstory removal would likely be beneficial as these treatments would open up the canopy and improve habitat conditions for *Botrychium pumicola*. However, should prescribed fire result in an extremely hot fire, plants could be killed both above- and below-ground. Ahlenslager (2005) cites an unpublished manuscript by C.L. Johnson-Groh that although slow, *Botrychium* sp. would recover after a severe fire through the surviving spores in the soil.

Castilleja chlorotica has been shown to significantly decrease in density as a result of fire (BLM, 2006). This is likely related to its dependency on a healthy shrub component, which would be

eliminated through burning. Mowing would likely decrease the density of *Castilleja chlorotica* since many shrubs would be killed. Overstory removal would likely have no effect on *Castilleja chlorotica*, although associated mechanical disturbance of the soil could have negative effects in soils lacking a rocky component.

Noxious Weeds

While noxious weeds can invade natural landscapes regardless of their ecological status, areas of disturbance usually provide fertile ground for noxious weeds to gain a foothold, and the greater the amount of disturbance, the greater the establishment. Any management practice which results in soil disturbance could result in some degree of establishment of early-seral or invasive species, including noxious weeds. These treatments would include mechanical treatments such as pre-commercial thinning, harvesting and mowing. Prescribed fire could also promote establishment of noxious weeds, particularly where there is an existing weed population and when there is intense heating of the soil surface, such as where there is litter buildup or slash piles. The Planning Area has proven to be relatively resistant to the wide-spread establishment of most noxious weeds.

Wildlife

This section describes the general effects of proposed vegetation treatments and travel route closures on species of focus and source habitats. Species of focus discussed in this analysis are bald eagles, spotted frogs, mule deer and Rocky Mountain elk. Source habitats (also described as plant communities) discussed include lodgepole pine/ponderosa pine and riparian/grass-meadow. The assessment of source habitats allows us to display effects on groups of wildlife species where effects would be similar, rather than repeating similar information for a large number of individual species.

The project area contains no habitat designated “critical” or “essential” for federally-listed species.

Species of Focus

Bald Eagle

The proposed action of thinning young trees and mechanically reducing the amount of fuel loadings around old growth ponderosa pine trees would have a beneficial affect to the pine trees and potential bald eagle habitats. Prescribed burning could have both positive and negative effects to bald eagle habitats. Prescribe burning, which reduces fuel loadings around old growth trees, would improve the health and security of the remaining trees. However, there would be some risk of fire killing a few of the trees, which could result in negative effects. Cutting and pulling away trees and shrubs from around the old growth trees would improve the likelihood of the trees surviving the burn.

Project design criteria such as seasonal restrictions and distance buffers would ensure bald eagles would not be disturbed during nesting season. Also, prescribed fire managers would use smoke management forecasts to minimize smoke entering into suitable habitat and to ensure that dissipation of smoke would be adequate. Some of the prescribed burning would occur in the fall outside of the nesting season.

Oregon Spotted Frog
The proposed action could have some short-term negative effects with long-term beneficial effects on spotted frog habitats. The proposed meadow restoration treatments include prescribed fire, which could remove some vegetative cover around wetland habitats making the frogs more exposed to predation in the short-term. However, by removing forest vegetation from meadows the proposed action should help maintain or improve suitable riparian habitats by removing trees from the riparian areas. This should aide in maintaining relatively un-shaded emergent vegetation where spotted frogs breed.

There should be no direct effect to breeding habitat because breeding occurs in shallow, relatively un-shaded emergent wetlands and breeding ponds, which won't burn during the breeding season. Additionally, because adults are highly aquatic and are seldom found far from water there should few to no direct mortality of adults.

Mule Deer
The proposed project would consider changing the density and structure of the forest vegetation across approximately 60% on BLM-administered lands in the Planning Area. Approximately 40% of BLM administered lands within planning area, would be retained as hiding cover. Where possible, BLM will distribute hiding cover to meet primary wildlife needs, specifically related to cover and travel corridors. All of the treatments are proposed to occur within the mule deer migration corridor, but not all of the treatments would be in suitable hiding cover. Also, some areas are old meadows that are being taken over by pine trees and the proposed action is to restore the meadow. Commercial thinning would occur on 3,538 acres of suitable hiding cover of which 454 acres would be located in the northern high-use migration corridor on BLM-administered lands. Currently, 25 percent (1,012 ac.) of the northern high-use migration corridor provides suitable hiding cover. Commercially thinning approximately 454 acres of hiding cover would change the suitability of the vegetation so that it would not provide hiding cover resulting in 14 percent (558 ac.) available hiding cover in the northern high-use migration corridor after harvests.

Pre-commercial thinning and prescribed fire proposed for the commercial thinning units would continue to degrade what cover would be left after the thinning, but would not affect any other additional cover except for areas located in a meadow restoration treatment.

There would be an additional 707 acres of commercial thinning in the La Pine State Park where there is approximately 80 percent (1881 ac.) existing hiding cover. The commercial thinning would change the suitability of the vegetation so that it would not provide hiding cover. This would result in 50 percent (1174 ac.) available hiding cover in the northern high-use migration corridor on State Park Lands. Pre-commercial thinning and prescribed fire are proposed on an additional 802 acres of hiding cover in the State Park which would continue to decrease the amount of hiding cover to 16 percent in the La Pine State Park.

In the southern migration corridor the proposed action remove approximately 6,920 acres of hiding cover including 1,602 acres in commercial thinning units. The proposed treatments

would drop the amount of hiding cover from 45 percent (12,170 acres) to 19 percent (5,250 acres).

These vegetative treatments would temporarily change the suitability of the hiding cover. Because the forest thinning would open the forest floor to greater amount of sunlight and competition for resources, the ground vegetation would respond positively and begin to grow and fill in the forest gaps created by the thinning. In 10 to 20 years the thinned areas would likely provide suitable hiding cover conditions again in many of the treated areas.

The existing road densities in the Project Areas are above desired levels when managing for deer. The proposed actions would not increase the amount of designated roads, however by decreasing the amount of trees, shrubs and down logs the proposed action would increase the openness of the forest communities which would allow easier motorized access into the areas off of designated roads. Additionally, forest thinning operations would create temporary skid roads which then could be more visible and accessible to the general public.

Rocky Mountain Elk

The proposed action would have effects on elk habitats. For example, thinning out dense lodgepole pine and ponderosa pine stands would allow greater sunlight to the forest floor and increase the amount of forage for elk. However, removing forest cover from thinning would reduce the amount of hiding cover which elk also need, especially during autumn. Land management guidelines of 40 percent hiding and thermal cover to 60 percent forage area have been widely accepted as optimal for elk (Toweill and Thomas, 2002). In the Planning Area, currently the cover to forage ratio is 57 percent (62,907 acres) cover to 43 percent (67,067 acres) forage on all ownerships.

The proposed action would increase the amount of forage on approximately 8,742 acres from thinning and prescribed burning. The proposed action would have short-term adverse effects, on elk winter range by reducing the amount of hiding cover, especially in the northern migration corridor where there is a primary wildlife emphasis for managing for elk habitats. In elk winter range located in the northern migration corridor the proposed action would remove 267 acres of cover reducing the amount of cover from 32 percent to 21 percent (543 acres).

The existing road densities in the project areas are above desired levels when managing for elk. The proposed actions would not increase the amount of designated roads; however, by decreasing the amount of trees, shrubs and down logs the proposed action would increase the openness of the forest communities which would make motorized travel more accessible to off-road travel. Additionally, forest thinning operations would create temporary skid roads which would be more visible and accessible to motorized travel.

For effects on elk habitats in the southern migration corridor see the effects description for mule deer because the elk winter range is completely within the mule deer migration corridor and the effects would are similar.

Source Habitats

Lodgepole Pine/Ponderosa Pine

The proposed action would decrease the amount of lodgepole pine forest communities and increase the amount of ponderosa pine forest communities. By removing most of the lodgepole pine on approximately 4,500 acres where there is a fair amount (at least 25 percent of the stand) of ponderosa pine, the habitat type would be changed from a relatively closed canopy mixed lodgepole/ponderosa pine habitat to a more open canopy ponderosa pine community. This action would change the suitability of these forest habitats for some species of wildlife. For example, five species of birds (e.g., northern goshawk, great gray owl, three-toed woodpecker, black-backed woodpecker, and pine grosbeak) are closely associated with lodgepole pine forests, while there are 13 species of birds closely associated with ponderosa pine forests. Only two of these species (northern goshawk and great gray owl) are found to be closely associated with both plant communities. However, because the proposed action would decrease the canopy cover in these forest stands, the resulting conditions may not be suitable for all species that would be found in a ponderosa pine forest that typically have a higher canopy closure. For example, goshawks typically nest in forests with a high canopy cover, but would generally use open forests (with a low to medium amount of forest cover) for foraging.

Riparian/Meadow

The proposed action would maintain or help restore 550 acres of meadow habitats mostly located along the Little Deschutes River. There are approximately 30 species of birds that are closely associated with meadows that would benefit from maintaining healthy riparian and meadow habitats.

Grazing

Grazing would be greatly benefited from treating the proposed acres. It would take a few years to see improved vegetative diversity, but with fewer trees, plants would have the light and soil moisture necessary to thrive in the newly balanced plant community. Grass and forbs species would eventually respond positively to the treatments with increased density and wider distribution. Grazing and wildlife animals would be able to uniformly utilize the vegetation in the allotment, as opposed to just grazing the few areas in which grasses and forbs are currently available. Individual plants would be allowed to rest for a longer period because the volume of plants would be greater, and the animals would be able to move from one part of the allotment to the other while leaving freshly grazed plants to recover. BLM upland health assessments would probably start showing an upward trend to these sites, as the overall health of these allotments improves.

Hydrology

On-site prescriptions for units located within riparian areas were not completed for this assessment, and would be completed during project implementation. However, the objectives, standards and guidelines as outlined in Appendix C for riparian areas would be applied during implementation of the project. In some site specific cases, a somewhat more aggressive treatment of vegetation may be warranted to better meet fuels objectives as demanded for safety reasons.

Large openings created by harvest or fire, either within the riparian zone or in the uplands can affect water quality, quantity and channel dimensions and change the local fauna and flora of local streams and lakes. However, with implementation of this project, treatments within riparian areas would include thinning of small pine and prescribed burning that would retain trees for shade, bank stability, sources of large woody debris (LWD), and habitat for riparian dependent species. The intent would be to improve riparian vegetative conditions and reduce the potential for large, catastrophic fires within the riparian area. The proposed riparian prescriptions would effectively support shade, intercept sediment, and provide LWD and allochthonous inputs to the rivers.

Based on the prescriptions and objectives of the project within riparian areas, it is likely that there would be some slight increase in solar radiation to stream channels. However, the amount would be immeasurable in terms of stream temperature. Thinning of the smaller trees would allow for growth of larger, taller trees that would provide additional shade in the long term. Therefore, there would likely be no increase in stream temperatures for those streams that are currently water quality limited and are on the 303(d) list.

There would also possibly be a slight, short-term increase in sediment associated with harvest activities and prescribed burning. Due to the flat terrain, and porous, sandy soils, the amount reaching the river channels would probably be immeasurable. In the long-term, the increase in shrubs, grasses, and forbs in the understory as a result of the thinning would improve groundcover and result in less sediment entering the stream channels.

Riparian plant species possess adaptations to fluvial disturbances that facilitate survival and reestablishment following fires, thus contributing to the rapid recovery of many streamside habitats (Dwire and Kauffman, 2003). Prescribed burning within the isolated meadows, according to guidelines in Appendix A, would likely improve sedge and rush productivity as long as the plants are burned in the late summer or early fall when the plants are dormant. Sedges and rushes are the dominant species within the meadows including Beaked sedge, Baltic rush, and common spike rush. These species would establish after fire through seed and/or lateral spread by rhizomes (USDA, website).

Soils

Ground based mechanical treatments and machine pile burning has the greatest potential to negatively impact the soil resource. Effects from ground based mechanical treatments include soil compaction from multiple passes over the same ground with heavy equipment. Topsoil displacement and loss of organic matter by skidding operations or mechanical brush piling. Compaction impacts can also occur from increased ATV traffic due to opening up the stands. Long-term brush mowing could push the soil microbial population from a fungal (tree) dominated system to a bacterial (grass) dominated system providing more fine fuels and increased burn frequencies. Large wood in contact with the ground surface could be reduced with the thinning and mowing operations. Wind erosion hazard increases on these soils when the vegetative cover is removed, the topsoil is impacted and the soil is dry.

Positive benefits include reducing fuel loadings for preventing catastrophic wild fires and reducing potential for detrimental burn damage (hydrophobic soil conditions), and increasing the diversity and cover of the vegetative under story.

Mechanical treatments (~ 19,212 acres)
Mowing of shrubs would utilize a mechanized tractor with a mowing head attached to reduce plant heights below a maximum of 9 to 12 inches. The primary focus would be on areas underneath residual tree islands where the existing shrub heights could function as ladder fuels. The use of a tractor with a mowing head has been monitored on the forest and shows minimal impacts to the soil resource when operated under soil moisture conditions at or below field capacity and above wilting points. Monitoring treatment units using single pass masticating equipment has shown minimal compaction effects. Operational use creating a mosaic within the treatment areas should not require multiple passes and extensive maneuvering that can incur detrimental compaction or displacement of the soil resource. Some areas between existing skid trails may have an elevated bulk density from multiple mechanized passes during previous entries that could be increased to detrimental levels from one or two passes of this equipment.

Mechanical Commercial Thinning: generally utilizes small three-wheeled or bobcat mounted shears, or larger track-mounted shears/hot-saws with swing boom.
Mechanical Non-Commercial Thinning: can involve either rubber tired, or tracked machines or hand chainsaw methods, depending on the type of stand and objectives.
Mechanical Machine Piling: usually done by tracked machine with brush rake, sometimes with a rubber-tired skidder or bobcat. A tracked vehicle with grapples may also be used. Piles are usually 10-20 feet in diameter.
Mechanical Masticating and Mowing: Tracked or wheeled machine to cut or break material to lower the fuel profile, reduce piece size, and put material into contact with the ground.

Hand thinning, piling and burning treatments (about 5,375 acres)
The use of pre-commercial thinning (PCT) hand-felling to cut trees prescribed for removal would not incur any additional detrimental compaction to these sites. The accumulation of this material, along with branches and small trees functioning as ladder fuels that were also cut, would result in piles that would be either chipped or burned. Preferences would be to pile this material on existing areas of detrimental compaction including skid trails and landings. The chipping of material would also not incur any additional detrimental conditions to the soil resource. The burning of piles would incur extended durations of elevated temperatures at the soil surface wherever they were piled. There would likely be some volatilization of ammonium nitrogen and other nutrients contained within the soil matrix of the surface mineral horizon underneath these burn piles, as well as some loss of fungal and bacterial populations. Losses would be short-term for these areas and would comprise approximately 1 percent of the treatment areas.

Hand Pre-commercial Thinning – manual with chainsaw.
Hand Piling – manual, small piles (5-10 feet in diameter)
Hand or Machine Pile Burning – high intensity, small area impacts.
Ponderosa Pine Stand Maintenance burning - low-intensity underburning

Meadow/Riparian Treatments broadcast burning – broadcast burning of mechanically pre-treated adjacent lodgepole pine thickets. Some fire spread into the meadow area is expected and desirable.

Cultural

The proposed actions to be implemented over the next five years within the Planning Area are aimed at fuels reduction. Reduction would be accomplished using a number of different mechanical treatments and some burning. Mechanical treatments vary in the nature of disturbance associated with them. The skidding and mechanical piling of logs and wooden debris are associated with considerable ground disturbing activities. Other types of mechanical treatments may be less impacting due to their nature (mowing or hand piling, for example). These types of activities can be mitigated by changing the season of application. Burning would be used sparingly. Burning can be particularly destructive to wooden historic sites, such as homesteads or certain livestock features. Mitigation measures would always begin with locating and fully recording sites. Avoidance is typically used as the first line of defense to protect sites from unnecessary impacts. However, more in-depth recording or testing could be applied in some cases where warranted. Changing the season of implementation could be another productive way to mitigate impacts to sites. For example, logging in a sensitive area can be accomplished in an over-snow or frozen ground setting. In other cases, hand work may be the most appropriate method to avoid impacts. Mitigation for any particular project would be determined on a case-by-case basis based on sensitivity, known sites, and the action being performed.

Recreation

Hazardous fuels reduction treatment would reduce the potential for catastrophic wildfire and decrease resulting loss of recreational opportunities due to wildfire. While this fuels reduction work in the project area is not expected to change recreational diversity, it could alter recreational activity levels in the short term and long term. Recreational activity could be diminished during treatment in the short term by limitations to road use, equipment activity and prescribed burning activity on trails and entire areas. Access for motorized and non-motorized activity could be changed from present levels by the proposed action. Rosland OHV Play Pit would continue to receive increasing recreational use pressure due population increase and motorized recreation trends. The UDRMP identifies as a priority to establish motorized connecting trails to forest service administered lands to the east and to establish additional non-motorized trails in the northern portion of the project area adjacent to La Pine State Park and within the Little Deschutes Parcel. Quality or desirability of some recreational activities and opportunities could be diminished by severe wildfire. Thus, hazardous fuels reduction treatments in the Project Area have the potential to improve recreation opportunities in the project area.

Recreation use is expected to continue to increase in the project area at the present rate. Recreation use would increase due to an estimated 30 percent population increase in Deschutes County. With Southern Deschutes County being the focus of development pressure in the county, more neighborhoods would be developed, increasing WUI issues, and need for recreational opportunities beyond private home sites. Recreational use (both motorized and non-motorized) is currently impacted by dead and down timber, dense shrub layer and thick lodgepole pine regeneration forcing public land users to primarily use existing roads and trails.

The La Pine Recreation Area Plan, as part of the Upper Deschutes Resource Management Plan, would designate motorized and non-motorized transportation routes and develop trailhead facilities, although implementation is not expected in the near future. Transportation planning efforts on BLM administered lands for motorized and non-motorized use are mandated by the RMP, but given federal budgets, funding and reduced staffing levels, transportation planning and enforcement is unlikely to occur in the next five years.

Table 4-3: Effects by treatment on recreation

Resource Element	Type	Fuels Treatment
Recreation	Land-based (Motorized)	Increase due to accessibility and lack of impediments to travel. Increase in density per acre
	Land-based (Non motorized)	Increase due to accessibility and reduction of travel impediments
	Water-based	No change or slight increase

Recreation use in the Planning Area is primarily local in nature with activity occurring from adjacent properties. With the exception of the Upper Deschutes Wild and Scenic River public boat ramps on Forest Service-administered lands and the La Pine State Park, recreation use is varied and dispersed throughout the project area. Treatments for improved wildlife viewing, education or interpretive opportunities could benefit recreational opportunities in the long term.

The reduction and removal of potentially hazardous fuels in the Project Area would reduce current impediments for cross country travel and recreation. In the short term there would be some increased opportunities to travel cross country in the project area, but short stubs of saplings left from mechanized treatment areas and slash on the ground would continue to provide some impediments to travel in the short term (up to 2 years). There would be increased opportunity to move throughout the project area in all seasons in the long term as stubs rot out and slash is burned or packs down after the first winter. Buffer areas close to developed neighborhoods would allow for the most opportunity due to more intense treatment prescription encouraging and creating new trails from adjacent residents, roads and interaction with public land recreational users. This could increase potential conflicts between users.

Visual Resource Management

The pro-active reduction and management of wildfire fuels would meet the desired fuel hazard condition. The prescription would stay within the Visual Resource Management (VRM) class guidelines, which are to preserve the existing character of the landscape, to limit change to very low levels and not attract the attention of the casual observer.

The proposed treatment would change or alter the landscape. Management activity would change the existing character of the landscape. The over-stocked vegetation density of the forest would be thinned. Visibility through the forest would be increased by the removal or reduction of dense understory vegetation and lodgepole regeneration. Opacity of the forest would change from dense and thick to more open and low or absent understory. Vegetation would remain the same,

but scenic vistas formerly blocked at the neighborhood level by dense stands of lodgepole pine regeneration and thickets of bitterbrush shrub understory, would be opened to view the existing prominent backdrop features. The natural wet meadows and pumice flats would be visible to the public due to reduction of dense thickets of lodgepole close to residences and at edges of the wet meadows and pumice flats. The change in fuel loading be reducing fuels would reduce the potential of stand replacing fire, and would maintain the visual quality and resource characteristics of existing vegetative matter. Treatment in the project area could change current resource characteristics in the short term, depending on type of treatment. Potential long-term vegetation changes could see improvement of visual quality as slash breaks down, slash piles are burned, chipped, or prescribed fire and mowing reduces understory vegetation. However, depending on the treatment characteristics, the level of change to the characteristic landscape could be very low and not attract attention.

Within the < 10 acres of BLM-administered lands in the Upper Deschutes Wild and Scenic River and State Scenic Waterway, thinning and burning of trees may affect Outstandingly Remarkable Values for the federally designated river, and Scenic features attributed to the State Scenic Waterway. However, treatment prescription would include criteria established in the Upper Deschutes Wild and Scenic River Plan of July 1996.

There has been significant fuels reduction work completed in the Planning Area. The pro-active reduction and management of wildfire fuels would meet the desired fuel hazard condition while staying within the Visual Resource Management VRM class guidelines, which are to partially retain the existing character of the landscape and to manage lands for moderate levels of change to the characteristic landscape. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements of form, line, color, texture and scale, found in the predominant natural features of the characteristic landscape.

Completed fuels reduction projects such as the THAW project, Antelope Meadow, Maston Road, Fall River Emergency Exit ROW, Fall River Estates 100-foot Buffer zone, State Recreation Road and La Pine state park where fuels thinning with machines and handwork, demonstrate work in similar fuels, landscape and resources, which retain the character of the landscape. These treatments and do not dominate the view of the casual observer.

Management Direction

The Visual Resource Management guidelines in the Upper Deschutes Resource Management Plan specify that all of the Planning Area is VRM Class III and IV. While Highway 31 (a National Outback Byway), Paulina Lake Road and Highway 97 are noted for highly sensitive visual quality with striking views of the Cascades Peaks and Newberry National Monument, current harvest units and fuels reduction projects have had little impacts on the view. Changes can be made, but should not attract the attention of the casual observer. In some cases fuels reduction work would create additional openings in the canopy of dense thickets of lodgepole regeneration that would create new views of the high peaks, river corridors and open wet meadow viewsheds.

Design of the proposed action primarily focuses on how best to move toward meeting the desired area vegetation/fuels condition while meeting VRM class III guidelines. Management activities in highly visible landforms that form a community backdrop would not be evident. Since prominences that form a community backdrop create a highly sensitive visual component, special consideration would be provided to Paulina Peak and Paulina Lake Road, Finely Butte Road, State Recreation Road and points along the little Deschutes River and Upper Deschutes Wild and Scenic River.

Table 4-4: Effects on Visual Quality

Visual Quality	Foreground	Increased forest transparency and views due to thinning; Decrease in sense of privacy and wildness to private homeowners in adjacent neighborhoods; Increase park like setting to recreate historic cover and old encourage old growth Ponderosa; Safeguarded to protect WSR and state scenic river values and High Sensitivity areas, corridors and buffers
	Background	Percentage limitations on forest crown thinning would reduce impacts and limit effects on natural cover; increase scenic vistas due to thinning and opening of canopy and under story.
	Seldom seen	Fuels treatment would not be visible
	General Forest	Increase of visual variety, openings and forest transparency; increase visual interest.

Air Quality

Prescribed fire activities would be conducted in compliance with the National Ambient Air quality Standards and Oregon Department of Oregon Environmental Quality regulation and restrictions and Oregon Department of Forestry State Smoke Implementation Plan to track smoke produced and monitor particulate matter and carbon monoxide emissions. Prescribed fire would only be conducted when prevailing and predicted wind patterns and atmospheric conditions would result in negligible effects to the Bend Designated Area and the Three Sisters Wilderness Class 1 Airshed.

Smoke emissions connected with the proposed action are of concern due to the Project Areas' proximity to homes/communities in the Wildland Urban Interface, La Pine, Sunriver and Bend. Emission predictions for the project area were generated using the Modification and Validation of Fuel Consumption Model (Consume)[9]. The software predicts the amount of fuel consumption and emissions from the burning of logged units, landing/machine/hand piles and natural fuels.

The Planning Area is generally influenced by south/southwest winds in the basin, turning more westerly on the ridge top early to late afternoon. Inversions are probable in lower elevations and tend to dissipate by mid-morning. Populated areas could potentially have impacts from prescribed fire are along the Deschutes River drainage. Prescribed fire burning would commence under atmospheric conditions that would limit smoke intrusions into nearby

[9] Please note that the wildfire category was used to show the air quality affects if none of the area was treated and was burned under a wildfire scenario.

residential/industrial areas, roads and communities. A prescribed burn plan would be established prior to any burning in the project area, which would describe the conditions, or weather parameters (wind directions/speed, relative humidity, air temperature and fuel moisture) that would have to be met prior to ignition.

Table 4-5 Emissions Predicted in the Project Area for the Next 5 Years

Fire Type	Acres Burned	PM 10 (tons)	PM 2.5 (tons)	CO (tons)
Activity Fuels	3,551	298.80	284.86	158.09
Landing Pile	200	15.90	13.85	N/A
Machine Pile	800	8.31	7.24	N/A
Hand Pile	875	2.12	1.84	N/A
Natural Fuels	3,500	204.09	195.2	1,153
Wildfire	9,302	1,196.23	1,110.89	9,272.17
Total	18,228	527.15	787.46	1,311

4.3 Cumulative Effects

Scoping for this project did not reveal any need to exhaustively list individual past actions or analyze, compare, or describe the environmental effects of these actions. There are no known current or predicted future actions within or surrounding the project area that, when coupled with the actions described in this environmental assessment, would lead to effects beyond those already described in this EA.

The current conditions on lands potentially affected by the Proposed Action result from a multitude of natural and human events that have taken place over many decades. A complete, detailed description and analysis of all events and their effects is not possible to compile, would be unduly costly to explore in detail, and would not provide any clearer picture of the existing environment.

Key past events believed to have shaped current environmental conditions in the project area include weather cycles; increased human settlement; exploitative livestock grazing practices of the late 1800's/early 1900's; subsequent changes to livestock grazing strategies; general exclusion of unplanned fire from the project area; and previous mechanical treatments.

When coupled with past actions, implementation of the Proposed Action would help ameliorate outcomes of past practices through watershed and vegetation health and functioning improvement, and re-establishment of vegetation and other fuels more appropriate for soils, climate and landform. The associated actions would also complement earlier efforts (such as thinning and prescribed burning) designed to enhance environmental conditions.

Fire/Fuels

The analysis area has fuel models 1, 6, 8 and 10 intermixed throughout project area. The ground fuel models do not consider aerial fuels (i.e. ladder fuels or crowns) in the total assessment of the fire behavior potential. Where low branches or smaller trees below larger ones are dense enough, ground fire may move up through these lower aerial fuels into the crowns of larger trees

causing either sever scorching of the larger tree branches or complete burning or torching of the crowns. Crown bulk density is an indicator of whether or not crown fire potential does exist. Crown fires are one of the most intense wildfires experienced across the western states and are very difficult to suppress (Anderson 1982).

Expected Fire Behavior by fuel model (90th percentile weather)
Average summer conditions in the Planning Area might include an 85 degree Fahrenheit day, relative humidity between 12 percent to 15 percent, fuel moistures of: (1 hour fuels) 3 percent - 4 percent, (10 hour fuels) 5 percent - 6 percent, and (100 hour fuels) 8 percent - 9 percent, and mid-flame wind speeds around 4-6 mile per hour. Fire burning under these conditions can be expected to burn actively. The rate of spread and intensity of the fires would increase with the addition of slope or increase wind speed. The following examples are for flat terrain.

Fuel Model 1 (considered a light ground fuel, predominately grass) has a rapid rate of spread (60 chains an hour) similar to fuel model 6; however, it has less intensity. Fire-line intensity under a 6 MPH mid-flame could facilitate a direct attack by suppression forces as flame lengths can be 4 foot and less. Retardant is usually a very effective too in this fuel model.

Fuel Model 6 (considered moderately dense shrubs) could burn approximately 100 acres in 1 hour. Fire-line intensity would be so great that direct attack with ground forces would be difficult, even with light mid-flame wind speed. A 6 MPH wind speed could create 8 foot flame lengths, thus requiring heavy equipment just a dozers, engines or aircraft to control the fire. Embers of burning debris could start spot fires outside the main fire by being carried in the smoke column or by wind. Downwind spotting could be predicted up to 0.5 miles from the main fire. The potential of a spot landing outside the main fire and igniting unburned vegetation is 80 - 90 percent.

Fuel Model 8 (described as a short-needle conifer, low fuel loading model) is similar to fuel model 6, but with less fire behavior potential. This compact fuel layer limits flame length and fireline intensities. With a 6 mph mid-flame wind speed, the flame length would be 2 feet. Occasional fuel concentrations would increase fire behavior. With large single structured stands, the fire would be limited to the surface and spotting distances would be short range.

Fuel Model 11 (considered heavy needle and moderate ground fuels) would not have the rapid rates of spread as a Fuel Model 1 or 6, however, it would have much great intensity due to the moderate ground fuels. Under a 6 mph mid-flame wind speed, flame lengths are predicted to be greater than 6 feet, thus requiring heavy suppression activities. In areas of the forest that have dense stands, active torching and crowning could occur, leading to intense wildfires and long range spotting of up to 1 mile.

Fuel Reduction/Large Fire Risk Reduction Strategies
Given an existing condition, strategies must be developed to move toward a desired future condition. These strategies help direct locations and types of treatments.

Defensible/Safe Egress Routes

Road systems allow ground suppression forces (engines, crews and equipment) to access and the general public to escape wildfires. When fuel conditions allow ground fire to get into the canopies of the trees (ladder fuels) and intense torching and crowning of these canopies contribute to long range spotting, then direct attack of a wildfire is difficult and dangerous.

By reducing crown densities adjacent to egress routes and road rights-of-way, through thinning and reduction of ground fuels and ladder fuels by both mechanical treatment and prescribed fire, wildfires would be less intense and allow suppression forces the ability to control the fire and also provide immediate evacuation of an area for public safety. To be an effective treatment area, it is recommended that both sides of the road be treated up to 150 feet.

Strategic Placement of Treatments (SPOT)

Nature fuel treatments (i.e. thinning, mechanical shrub treatment and prescribed fire) would not be effective in helping contain wildfire spread unless they're strategically placed on the landscape. The objectives of the SPOTS are to reduce fire rates of spread and reduce fire spotting distance and potential. The placement of the treatment should provide an eddy effect. The sizes of treatment would vary depending on fuel conditions and it is recommended in large block areas, at least 10 percent of the area be treated.

Restoration of Ponderosa Pine Ecosystems

Where there has been a deviation from historic fire return interval, usually from fire suppression, fuels build to the point where low intensity fires are rare. Instead, high intensity fires dominate the landscape. If many natural cycles of fire have been missed (Condition Class III), the fuel loading and stand densities may have increased to the point where multiple entries may be needed to accomplish treatment objectives. These entries may entail removal of dense understories and modification of ground fuels (i.e. mechanical shrub treatment, piling debris and burning piles) and prescribed fire.

Activity Fuel Reduction/Discontinuous Ground Fuels

Areas with either existing dead down material, dense shrubs or activity slash from harvest/woodcutting can create hazardous fuels conditions. If these conditions exist over a large area, a wildfire would be difficult to control. Through the use of wood fiber utilization, mechanical shrub treatments, prescribe fire, machine/hand piling, the continuity of these large areas of heavy fuel loading can be disrupted, improving suppression efforts.

Thinning to Reduce Crown Fire Potential and Long Range Spotting

Crown fires are the most intense wildfires and usually produce long range spotting that make suppression efforts difficult. Dense stands of timber, regardless of species, support independent crown fires that allow it to burn through the canopy of the trees, independent of the ground fire. Torching and spotting, in conjunction with the ground fire is also a common problem during crown fires. Breaking up the connectivity of the tree canopies through thinning greatly decreases the chance of an independent crown fire and reduces torching and spotting.

Vegetation
Specifically, with respect to vegetation, there are complex interrelationships between biotic and abiotic components of forest plant communities. Natural and human-induced processes transcend ownership boundaries. Effects, existing and future, on the local level would contribute to existing and future effects on adjacent lands. Cumulative effects of vegetation changes would occur on other resources such as wildlife, fish, visual quality, and watersheds. Effects of new vegetative treatments would contribute to the effects of older vegetative treatments, both on BLM-managed land and on adjacent private and other public ownerships. These effects would be mitigated somewhat by the separation in time and space between earlier treatments and the new treatments (Brown et al. 2006).

In the Planning Area, the primary emphasis in the Brothers/La Pine RMP (1989) was to salvage beetle-killed timber, reduce extreme fire hazard, and regenerate commercial forest. These objectives are still valid and have been achieved to varying degrees. Since 1989, approximately 29,000 acres have been treated, and 62 MMBF of timber have been harvested with salvage and seed tree silvicultural prescriptions as the primary treatment methods. The new Upper Deschutes RMP (2005) continues with direction and guidance for fuels reduction and restoration treatments within the Planning Area. The current proposed treatments, although using a variety of different prescriptions, would contribute to the long-term effects to plant communities, both desirable, and inadvertent.

While many forest products are currently being removed and used, as biomass opportunities increase, a net export of biomass would occur with successive thinning/harvest and prescribed fire treatments. These activities would cause a decrease in organic matter and nutrients, resulting in a cumulative degradation of site quality over the long-term. Nitrogen losses would be greater with prescribed fire than with timber harvest. Research addressing the effects of multiple rotation timber harvest on site quality is lacking, so the extent of this effect is unknown. This effect could be offset, at least partially, by applying fertilizers in specific areas/situations or by leaving fine woody material (tops, branches, foliage) on-site during mechanical treatments for organic matter retention and nutrient cycling.

Wildlife

Species of Focus
Cumulative effects regarding wildlife species also relate to the species of focus identified in the previous chapters. These species and cumulative effects include the following:

Bald Eagle
In February of 2006, the U. S. Fish and Wildlife Service proposed to remove the bald eagle from the list of endangered and threatened wildlife because current data indicate that the bald eagle in the lower 48 states has recovered. In the Pacific Recovery Region, where the proposed project is located, the recovery goals have been met since 1995. The proposed rules stated “adequate habitat is available to support existing bald eagles and to ensure future population growth” (Federal Register/Vol. 71, No. 32 / Thursday, February 16, 2006 / Proposed Rules).

The Deschutes NF LRMP (USDA FS 1990a) identified Bald Eagle Management Areas (BEMAs), which have specific requirements for maintenance and protection of eagle habitats. A total of 19,800 acres are included in 40 BEMAs across the action area. They range in size from 17 to 3,228 acres with an average size of 509 acres. There are specific standards and guidelines in the Deschutes NF LRMP that provide management direction for BEMAs.

The BLM manages little habitat with the potential for bald eagle nesting habitat. There is some potential habitat located on private lands; however, most of the significant water features are located on adjacent Forest Service land.

Cumulative effects of combined activities on BLM-administered lands and actions on other lands in the project area, and immediately adjacent areas, are expected to result in a may affect, not likely to adversely affect bald eagles and their habitat.

Oregon Spotted Frog

In and immediately adjacent to the project area there are approximately 33 miles of river and stream riparian habitats on Forest Service; 8 miles on State and 178 miles on private lands. The Forest Service follows standards and guidelines within riparian reserves that would help maintain and improve habitat conditions. Riparian areas within the State park are managed for recreation and scenic qualities which would not directly negatively impact habitat quality. Management and land uses on private lands vary across individual ownerships and likely have negative, positive and benign effects to habitat quality. Data on private land practices is not currently available.

Cumulative effects of combined activities of the proposed action on BLM-administered lands and actions on other lands in the planning area, and immediately adjacent areas, are expected to result in the maintenance of spotted frog habitat quality and quantity.

Mule Deer

Northern High-Use Migration Corridor- Of the land capable of providing hiding cover in the northern high-use mule deer migration corridor the Forest Service manages 42 percent (6,923 acres) of which 75 percent are currently suitable; the State Park manages 14 percent (2,359 acres) of which 76 percent are currently suitable; and private landowners manage 20 percent (3292 acres) of which 65 percent are currently suitable. However, the above calculations do not include recent fuels treatment activities that have taken place over the last several years.

When managing vegetation resources the Forest Service consults ODFW and typically mitigates negative effects of their land management actions on wildlife resources. The La Pine State Park, in coordination with the BLM, manages most of the forest resources in the park. BLM consults ODFW and mitigates negative effects of land management actions on wildlife resources. Private land in the northern migration corridor is broken into many small parcels and many are home sites with limited ability to contribute to hiding cover. Roads, driveways, OHV trails, fences and dogs are a few negative effects related to the private lands.

Southern High-use Migration Corridor- Of the land capable of providing hiding cover in the southern high-use mule deer migration corridor the Forest Service manages six percent (5,084

acres) of which 78 percent are currently suitable; the State Park manages no acres; and private landowners manage 62 percent (52,986 acres) of which 61 percent are currently suitable. However, the above calculations do not include recent fuels treatment activities that have taken place over the last several years. Also, some home sites have suitable vegetation that keys out as existing hiding cover, however, because of dogs, fences and frequent motorized vehicle traffic some of these areas may not be provide suitable conditions for mule deer use.

Entire Migration Corridor- Of the land capable of providing hiding cover in the entire mule deer migration corridor the Forest Service manages 23 percent (38,877 acres) of which 63 percent are currently suitable; the State Park manages one percent (2,359 acres) of which 76 percent are currently suitable; and private landowners manage 53 percent (90,720 acres) of which 65 percent are currently suitable. However, the above calculations are estimates of existing suitable hiding cover and do not include recent fuels treatments or other activities that have taken place over the last several years.

Rocky Mountain Elk

Of the land capable of providing hiding cover in the entire elk winter range in the analysis area the Forest Service manages 16 percent (18,016 acres) of which 72 percent currently provides cover; the State Park manages 2 percent (2359 acres) of which 76 percent currently provides cover; and private landowners manage 55 percent (60,789 acres) of which 39 percent currently provides. However, the above calculations are estimates of existing suitable hiding cover and do not include recent fuels treatments or other activities that have taken place over the last several years.

The existing road densities in the project areas are above desired levels when managing for elk. The proposed actions would not increase the amount of designated roads, however by decreasing the amount of trees, shrubs and down logs the proposed action would increase the openness of the forest communities which would allow easier motorized access into the areas off of designated roads. Additionally, forest thinning operations would create temporary skid roads which then could be more visible and accessible to the general public.

Activities on Other Lands

In addition to looking at cumulative effects on federally-managed lands, it is important to also consider the combined effects of fuels reduction activities taking place on other lands in the project area. While many neighborhoods are not officially organized and do not currently have requirements for hazardous fuel reductions, many grassroots efforts are taking place to establish safer neighborhoods. Ponderosa Pines is one neighborhood that has taken measures to reduce vegetation including having organized clean-up days, and conducting thinning operations on almost 200 acres of commons land in the subdivision. Numerous other neighborhoods are in the process of organizing similar efforts. In addition, based on informal tallies during FireFree Days where residents are allowed to bring yard debris for free, neighborhoods throughout Deschutes County brought in well over 20,000 cubic yards of debris, much of it brought in by residents in the wildland-urban interface.

In addition to smaller, neighborhood-generated efforts, residents on lands protected by the Oregon Department of Forestry are now subject to the regulations put forth in the Oregon

Forestland-Urban Interface Fire Protection Act (1997), often called Senate Bill 360. This law responds to the following problems:

- wildland fires burning homes
- firefighters risking their lives in conflagrations
- rising suppression costs
- reduced fire protection for wildland areas

Senate Bill 360 provides four important steps that lead toward an effective wildland/urban interface protection system by:

- establishing legislative policy regarding wildland/urban interface fire protection
- defining the wildland/urban interface in Oregon, and establishing a process and system for classifying the interface
- establishing standards for wildland/urban interface property owners so they can manage or minimize fire hazards and risks
- providing the means for establishing adequate, integrated fire protection systems in wildland/urban interface areas, including education and prevention efforts

In Deschutes County, approximately 30,000 property owners received letters of notification in 2005, and residents have two years to comply with the new law. With respect to fuel reduction, these standards reduce ladder fuels, create defensible space by increasing tree spacing and removing brush and other flammable materials from around the house, address distances from the home of 30 – 100 feet depending on slope, and address clearing standards for roadways and driveways.

Deschutes County and the Oregon Department of Forestry also provide assistance to neighborhoods around the county. This assistance comes in the form of financial assistance to low income residents to clear their property, chipper services to neighborhoods, matching funds for large property owners to clear their property and support for the FireFree Weekends. In addition, federal assistance may be provided in the form of grants through the National Fire Plan and other community assistance programs.

Soils

Ground based mechanical treatments and machine pile burning has the greatest potential to negatively impact the soil resource. Effects from ground based mechanical treatments include soil compaction from multiple passes over the same ground with heavy equipment. Topsoil displacement and loss of organic matter by skidding operations or mechanical brush piling. Compaction impacts can also occur from increased ATV traffic due to opening up the stands. Long term brush mowing could push the soil microbial population from a fungal (tree) dominated system to a bacterial (grass) dominated system providing more fine fuels and increased burn frequencies. Large wood in contact with the ground surface could be reduced with the thinning and mowing operations. Wind erosion hazard increases on these soils when the vegetative cover is removed, the topsoil is impacted and the soil is dry.

Positive benefits include reducing fuel loadings for preventing catastrophic wild fires and reducing potential for detrimental burn damage (hydrophobic soil conditions), and increasing the diversity and cover of the vegetative under story.

Mechanical treatments (about 17,800 acres)
Mowing of shrubs would utilize a mechanized tractor with a mowing head attached to reduce plant heights below a maximum of 9 to 12 inches. The primary focus would be on areas underneath residual tree islands where the existing shrub heights could function as ladder fuels. The use of a tractor with a mowing head has been monitored on the Forest and shows minimal impacts to the soil resource when operated under soil moisture conditions at or below field capacity and above wilting points. Monitoring treatment units using single pass masticating equipment has shown minimal compaction effects. Operational use creating a mosaic within the treatment areas should not require multiple passes and extensive maneuvering that can incur detrimental compaction or displacement of the soil resource. Some areas between existing skid trails may have an elevated bulk density from multiple mechanized passes during previous entries that could be increased to detrimental levels from one or two passes of this equipment.

- Mechanical Commercial Thinning - generally utilizes small three-wheeled or bobcat mounted shears, or larger track-mounted shears/hot-saws with swing boom.
- Mechanical Non-Commercial Thinning - can involve either rubber tired, or tracked machines or hand chainsaw methods, depending on the type of stand and objectives.
- Mechanical Machine Piling: usually done by tracked machine with brush rake, sometimes with a rubber-tired skidder or bobcat. A tracked vehicle with grapples may also be used. Piles are usually 10-20 feet in diameter.
- Mechanical Masticating and Mowing: Tracked or wheeled machine to cut or break material to lower the fuel profile, reduce piece size, and put material into contact with the ground.

Hand thinning, piling and burning treatments (about 4,240 acres)
The use of pre-commercial thinning (pct) hand-felling to cut trees prescribed for removal would not incur any additional detrimental compaction to these sites. The accumulation of this material, along with branches and small trees functioning as ladder fuels that were also cut, would result in piles that would be either chipped or burned. Preferences would be to pile this material on existing areas of detrimental compaction including skid trails and landings. The chipping of material would also not incur any additional detrimental conditions to the soil resource. The burning of piles would incur extended durations of elevated temperatures at the soil surface wherever they were piled. There would likely be some volatilization of ammonium nitrogen and other nutrients contained within the soil matrix of the surface mineral horizon underneath these burn piles, as well as some loss of fungal and bacterial populations. Losses would be short-term for these areas and would comprise approximately 1 percent of the treatment areas.

- Hand Pre-commercial Thinning – manual with chainsaw.
- Hand Piling – manual, small piles (5-10 feet in diameter)
- Hand or Machine Pile Burning – high intensity, small area impacts.
- Ponderosa Pine Stand Maintenance burning - low-intensity underburning
- Meadow/Riparian Treatments broadcast burning – broadcast burning of mechanically pre-treated adjacent lodgepole pine thickets. Some fire spread into the meadow area is expected and desirable.

A wet soil is 100 percent available moisture or above. When you squeeze the soil water would drip out of it. Attached are directions and field methods for determining moisture content. In order to minimize the effects of compaction keeping the moisture content in the 0 to 50 percent range would be better. Most of the La Pine project area has loamy sand textures so use the guides for loamy sands. If you need quantifiable percentages of moisture content, 6 percent or less would be best. Proctor compaction curves for various soil textures show that a 6 percent dry weight moisture content or less for loamy sand and loam textures produce the least compaction. For clay textures, less than 18 percent dry weight would produce the least compaction (Page 66 Environmental Effects of Off-road Vehicles. 1983, Robert H. Webb; pp 66 Compaction of Desert Soils by Off-Road Vehicles).

4.4 Monitoring

This project will be monitored in accordance to the Upper Deschutes Resource Management Plan (Upper Deschutes Record of Decision and Resource Management Plan, pages 162-163). This will emphasize third party collaboration and adaptive management concepts. Ten percent of treated units may be qualitatively monitored using protocol identified in the Central Oregon Fire Management Service Monitoring Plan. In addition to a pre-treatment assessment, units would be monitored for at least two growing seasons following treatment, to attempt to determine the effects of the treatment. This plan provides a standardized set of protocols, allows for data sharing between units and agencies, and monitors the first order treatment effects of prescribed fire and mechanical treatments.

5.0 CONSULTATION AND COORDINATION

5.1 Agency Preparers

Name	Contributions	Title
Ron Halvorson	Botany/Invasive Weeds	Botanist
Steve Cohn	Coordination	Assistant Field Manager Deschutes RA
John Zancanella	Cultural Resources	Archaeologist
Steve Castillo	Forestry Practices, Vegetation	Forester
Brooke Anderson	Livestock Grazing	Rangeland Management Specialist
Teal Purrington	National Environmental Policy Act Coordination	Planning and Environmental Coordinator
Michelle McSwain	Hydrology, Wild and Scenic River	Hydrologist
Robin Snyder	Recreation/Visual Resource Management	Outdoor Recreation Planner/ Private Consultant
Tom Mottl	Recreation/Visual Resource Management	Outdoor Recreation Planner
Bill Dean	Wildlife, Vegetation	Wildlife Biologist
Jimmy Eisner	Fisheries	Fish Biologist
Ed Horn	Soils	Soil Scientist
Dennis Fiore	Team Leader, Fuels/Fire	Fuels Specialist
Lisa Clark	Writer/Editor	Mitigation Specialist
Geoff Babb	Fuels/Fire	Fire Ecologist

5.2 Persons, Agencies, and Organizations Consulted

In addition to internal contributions, the Proposed Action was formulated in part based on past governmental/public/other agency comments, opinions, concerns, publications and observations concerning the current resource and management situations and changes therein deemed desirable (or undesirable) within the La Pine Basin in Central Oregon. Such input was received during meetings, research seminars, and informal discussions, field tours, publication review and through correspondence. Consultation and coordination specific to this project was performed with representatives of the following:

1. Glen Ardt, Oregon Department of Fish and Wildlife
2. Ed Keith, Oregon Department of Forestry
3. Members of the Upper Deschutes River Natural Resources Coalition
4. Members of the La Pine CWPP Steering Committee

5. Members of the Walker Range CWPP Steering Committee
6. Joe Stutler, Deschutes Country
7. Walker Range Fire Patrol
8. Amy Gillette, Oregon Park and Recreation Department
9. Chief Gustafson, La Pine Rural Fire Department
10. Kelly Esterbrook, US Forest Service, Deschutes National Forest
11. Fall River Estates Home Owner's Association
12. Ross Kihs, La Pine State Park
13. Sandy Lonsdale, Vulcan Power Company

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7.0 FONSI

FINDING OF NO SIGNIFICANT IMPACT

Greater La Pine Community Urban Interface
Hazard Fuel Reduction Project
Environmental Assessment (EA) No. OR 056-06-078
Prineville District Bureau of Land Management, Deschutes Resource Area

A. INTRODUCTION

The Bureau of Land Management (BLM) has conducted a programmatic environmental analysis (Environmental Assessment Number OR-056-06-078) for a proposal addressing hazard fuel reduction of the La Pine basin, within the communities of La Pine encompassing southern Deschutes County and northern Klamath County. The primary purpose of the project is to improve public safety by reducing hazardous fuels adjacent to communities at risk of wildfire. The BLM would conduct a variety of activities to manipulate the vegetation to reduce flame lengths of surface fire and reduce the potential for crown fire (wildfire moving through tree canopies, rather than staying on the ground). A secondary purpose of the project would be to restore ecosystem health and to improve long-term resiliency to insects, disease and fire. Ecosystem management concepts would be incorporated into fuels reduction treatments and would be a primary consideration in treatments beyond ¼ mile from homes and other developments.

- Reduce the crown fire potential by reducing fuel loading, ladder fuels, and crown bulk density consistent with the Upper Deschutes RMP (UDRMP, pages 61-62). In the planning area, treating approximately 19,212 acres, a reduction of approximately 60% would move us towards this objective.

In addition to protecting lives and property, reducing hazardous fuels lessens wildfire intensity; making them easier to control and reducing overall suppression costs.

- Provide for an increase of defensible space areas created within the wildland-urban interface boundary to lessen wildfire intensity and provide conditions where firefighters can be safe and successful in suppression efforts under hot, dry summer weather (UDRMP pages 62-64) by approximately 20% in the planning area; and create a situation where wildfires are easier to control and reduce costs.

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Fuel reduction projects maintain and improve forest and range health by recycling nutrients, decreasing competition for water and sunlight, and increasing resistance to bugs and disease. These activities also improve wildlife habitat by increasing food supplies such as native grasses and shrubs.

- Manage stand structure, density, species composition, patch size, pattern and distribution to provide an environment in which fire intensity can be managed for human safety and fire effects are compatible with other management objectives (UDRMP, pages 33-34).

Fuel reduction treatments, including thinning, prescribed fire, patch cuts, etc., can also maintain and improve ecosystem health by recycling nutrients, decreasing competition for water and sunlight, and increasing resistance to insects, disease, and fire. These activities improve wildlife habitat by increasing

quantity and quality of forage and by maintaining and promoting large/old forest structure, riparian, and other diverse habitats.

- Maintain and improve ecosystem health can be accomplished by recycling nutrients, decreasing competition for water and sunlight, and increasing resistance to insects, disease, and fire (UDRMP, pages 51-55). These activities improve wildlife habitat by increasing quantity and quality of forage and by maintaining and promoting large/old forest structure, riparian, and other diverse habitats.

The Greater La Pine Community Wildland Urban Interface project area includes approximately 29,000 acres of BLM managed lands and 1,600 acres of cooperatively managed Oregon Parks and Recreation Department (La Pine State Park) lands. Embedded within the project area are 41 communities at risk, as identified in the Greater La Pine, Upper Deschutes River Natural Resource Coalition and Walker Range Community Wildfire Protection Plans. The environmental assessment (EA) is attached to and incorporated by reference in the Finding of No Significant Impact (FONSI) determination. The particular EA is being written under the guidance of the Healthy Forest Restoration Act, thus only requiring the analysis of the proposed action.

The proposal is in conformance with the Upper Deschutes Resource Management Plan (UDRMP). Treatment would occur through various vegetation management prescriptions, as addressed in the proposed action. Chapter 1 of the EA describes issues raised during scoping and identifies potential impacts. The Proposed Action does meet the purpose and need of the project and will effectively reduce the potential for catastrophic fire.

B. FINDING OF NO SIGNIFICANT IMPACT

Based upon review of the EA and supporting documents, I have determined that the project is not a major federal action and will not significantly affect the quality of human environment, individually or cumulatively with other action in the general area. No environmental effects meet the definition of significance in the context or intensity as defined in the 40 CFR 1508.27 and do not exceed those effects described in the UDRMP. Therefore, an environmental impact statement is not needed. This finding is based on the following discussion:

Context: The project is a site-specific action directly involving approximately 29,000 acres of BLM managed land that by itself does not have international, national, region-wide or state-wide importance.

Intensity: The following discussion is organized around the Significance Criteria described in 40 CFR 1508.27.

1. **Impacts may be both beneficial and adverse.** The vegetative treatments described in the proposed action would have varying degrees of impact to resources as described in Chapter 4 of the EA. Mitigations to reduce impact on wildlife, fisheries, water quality, soils, air quality, visual resources, cultural and historic resources have been incorporated in to the design of the proposed action. None of the environmental effects discussed in detail in the EA and associated appendices are considered significant, nor do the effects exceed those described in the UDRMP.

2. **The degree to which the proposed action will affect public health or safety.** The proposal is designed to reduce the risk of high intensity/severity wildfire within the wildland urban interface within the La Pine basin**.** This includes the objectives to increase and improve suppression capabilities and reduce personal exposure of risk of local, state and federal firefighters.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wildland scenic rivers or ecologically critical areas.** The historic and cultural resources of the area have been inventoried and potential impact mitigated in the design of the proposed action. Residing within the project area is the La Pine State Park and the Deschutes Wild and Scenic River.

4. **The degree to which the effects on the quality of human environment are likely to be highly controversial.** Extensive collaboration of the project through the development of the local Community Wildfire Protection Plans resulted in support from the community members. Extensive public involvement was obtained throughout the EA process by BLM due to the number of Community Wildfire Protection Plans being developed. The ability for the BLM to participate in the creation of these documents provided numerous opportunities to interact with community members and key stakeholders, as well as solicit input regarding the development of the action alternative. In addition to participation in the steering committee for many CWPP meetings, the agency also had the following outreach:
    - Interagency Field trip Fall of 2004 involving Oregon Department of Fish and Wildlife, Oregon Department of Forestry, Oregon Parks and Recreation District, Crown Pacific (now Olympic Resources), the Deschutes National Forest, BLM, Upper Deschutes River Natural Resource Coalition CWPP members, Walker Range CWPP project planners, individual landowners and other stakeholders
    - Numerous CWPP public outreach meeting spanning 2004 through 2006
    - Official Public Scoping Meeting July of 2005
    - Official Public Scoping Meeting Field Trip July of 2005

5. **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.** This project is not unique or unusual. The BLM has implemented similar action in the La Pine Basin since the early 1970's. The environmental effects to the human environment are fully analyzed in the EA. No predicted effects on the human environment are considered to be highly uncertain or involve unique or unknown risks.

6. **The degree to which the action may establish a precedent for future actions with significant efforts or represents a decision in principle about a future consideration.** The project does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration. The project is typical of previous actions and is consistent with the established practices fully analyzed within the UDRMP/FEIS. Any future projects will be evaluated through the National Environmental Policy Act (NEPA) process and will stand on their own as to environmental effects.

7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.** The interdisciplinary team evaluated the possible action in context of past, present and reasonable foreseeable actions. No significant cumulative effects are predicted. A complete disclosure of the effects of the project is found in Chapter 4 of the EA.

8. **The degree to which the action may adversely affect districts, sites, highways, structures or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction if significant scientific, cultural or historical resources.** The project will not adversely affect districts, sites, highways, structures or other objects listed in or eligible for listing in the National Register of Historic Places, nor will it cause loss of destruction if significant scientific, cultural or historical resources.

9. **The degree to which the action may adversely affect an endangered or threatened species or it's habitat that has been determined to be critical under the Endangered Species Act of 1973.** Mitigations to reduce impacts to special status plants and wildlife have been incorporated into the design of the Proposed Action. No Special Status fish species occupy habitat within the project boundary. Mitigations to riparian habitat have also been incorporated into the Alternative to further reduce impacts to Special Status Species.

10. **Whether the action threatens a violation of the Federal, State, Local or Tribal law, regulation or policy imposed for the protection of the environment, where non-Federal requirements are consistent with Federal requirements.** The project does not violate any known Federal, State, Local or Tribal law or requirement imposed for the protection of the environment. State, Local and tribal interests were given the opportunity to participate in the environmental analysis process. Furthermore, the project is consistent with applicable land management plans, policies and programs.

11. **Comply with Executive Order 11988 (Floodplain Management), Executive Order 11990 (Protection of Wetlands) or the Fish and Wildlife Coordination Act (water resource development project only).** There are no floodplains, wetlands or water resource projects that could be adversely affected by this project.

12. **Involve unresolved conflicts concerning alternative uses of available resources (NEPA section 102(2)(E)) not already decided in an approved land use plan.** There are no unresolved conflicts not already covered in the approved Upper Deschutes Resource Management Plan.

13. **Have a disproportionate significant adverse impact on low income or minority populations; Executive Order 12898 (Environmental Justice).** This project does not have a disproportionate significant adverse impacts on low income or minority populations; Executive Order 12898 (Environmental Justice).

14. **Restrict access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites; Executive Order 13007 (Indian Sacred Sites). Have significant adverse effect on Indian Trust Resources.** The project would not restrict access to, or ceremonial use of, Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites; Executive Order 13007 (Indian Sacred Sites). This project would not have significant adverse effect on Indian Trust Resources.

15. **Contribute to the introduction, existence or spread of: Federally listed noxious weeds, (Federal Noxious Weed Control Act); or invasive non-native species; Executive Order 13112 (Invasive Species).** This project would not contribute to the introduction, existence or spread of Federally listed noxious weeds or invasive non-native species. Mitigations to control the spread of weeds have been incorporated into the design of the Alternative.

16. **Have a direct or indirect adverse impact on energy development, production, supply and/or distribution; Executive Order 13212 (Actions to Expedite Energy-Related Projects).** This project does not have a direct or indirect adverse impact on energy development, production, supply and/or distribution.

Approved: _*/s/ Molly Brown*_____ Date:___03/21/2007__

Molly Brown
Resource Area Manager
Deschutes Resource Area

APPENDICES

Appendix A – Treatment Prescriptions

Appendix B – Wildlife

Appendix C – Hydrology

Appendix D – Soils

Appendix A – Treatment Prescription Categories

Treatment Prescriptions

These treatment prescriptions consider ecosystem management within the context of managing fuels within a major wildland-urban interface. These prescriptions are dependent on the location of the treatment unit within the WUI bands as well as the vegetation classification. Prescriptions are based on proven silvicultural principles and are designed to achieve specific objectives for ecosystem restoration, management of insects and disease, and wildlife habitat improvement. Where the vegetation types described below intersect with critical areas identified for fuel reduction, these prescriptions will be adjusted accordingly to accommodate fuels reduction objectives.

Lodgepole Pine Management

Acres: Acreage varies

Description:
This vegetation type spans much of the Band 1 and 2 fuels treatment zones as well as the other treatment prescription areas described below. Lodgepole pine is ubiquitous and expanding in the planning area. Therefore, much of the management for lodgepole pine would focus on reducing its occurrence where it is encroaching on and affecting other plant communities or habitat diversity/quality.

There is a distinction between the fire ecology of lodgepole pine stands and ponderosa pine stands. To represent these differences and to model the differences between the two ecosystems, fire ecologists look at fire regime. Fire regime describes the frequency and severity at which particular ecosystems burnt with naturally occurring wildfires. Ponderosa pines fits into Fire Regime 1 with low intensity wildfires occurring on average every 4 – 28 years. Lodgepole pine, on the other hand, would fall into the category of Fire Regime 3, with high severity, stand-replacing fire occurring every 35 – 100 years. Meadows were kept open by frequent fire, which kept encroaching lodgepole pine contained to the perimeter. Ponderosa pine sites were also kept free of invading lodgepole pine by frequent low-intensity fire that killed most of the small lodgepole pine seedlings under the larger, more fire resistant ponderosa pines. Since broadcast burning is not appropriate in most areas of the WUI, and wildfire ignitions cannot be allowed to burn, alternate mechanical means of managing lodgepole pine will be required.

Objectives:
Lodgepole pine management for ecosystem benefits would focus on reducing lodgepole pine in ponderosa pine stands and meadow ecosystems. In ponderosa pine and meadow sites, treatments will restore a more natural (historic) condition on the landscape, and one that, when fire is present, supports low-intensity fires with flame lengths that fire suppression crews can safety fight on the ground. Since lodgepole pine often burns in a manner that produces a stand-replacing crown fire, project goals within lodgepole pine sites are not to maintain natural processes, but to decrease stand density, manage for other plant community types, and reduce the

likelihood of crown fire. Since lodgepole pine is highly susceptible to fire, the emphasis for lodgepole pine management in this WUI would be to replace it with the more fire resistant ponderosa pine where possible on appropriate sites, or to manage it in a structure more like a ponderosa pine ecosystem.

Prescription:

1. Implement prescriptions targeting lodgepole pine when it occurs in the vegetation types or management areas described below. Prescriptions for ponderosa pine restoration, meadow restoration, and wildlife habitat emphasis describe specific treatments for lodgepole pine in these areas.

2. In pure or nearly pure lodgepole pine types, lodgepole pine will generally be managed for fuels reduction and wildlife habitat emphasis, not for historic range of variability.

3. Where lodgepole pine occurs in Band 1, treatments would attempt to reduce and maintain lodgepole in a relatively low density structure. Trees thinned to 20-30 foot spacing would tend to remain healthy, grow large, and be much less susceptible to the usual influences of insects, disease, and fire. Periodic maintenance in these stands by mowing and pre-commercial thinning would eventually produce a stand that would be similar in structure to a mature ponderosa pine stand type.

4. Patch Cuts: In Bands 2 and 3, where large lodgepole pine stands are in poor health (i.e. dense, suppressed, and infected with disease or insects, or highly susceptible), consider group selection or "patch cuts." Patch cuts would be ¼ to 5 acres in size. The openings would be in various shapes with an irregular boundary to facilitate natural regeneration from the adjacent stand and to maximize habitat edge effect. The total area of all patch cuts in the planning area would not exceed 5 percent of the planning area during the estimated 7-10 year implementation time frame of this EA. Patch cuts would be a means for managing insects and disease and developing healthier future lodgepole pine clumps while retaining current cover, providing habitat diversity, and breaking up fuel continuity in large, contiguous stands. In some cases, prescribed burning may be applied to achieve the same effect as cutting in areas where fire can be safely managed. Because of current wildlife cover issues, implementation of this prescription would be conservative in the first few years in terms of number of patch openings and size.
. This prescription would usually be applied in three situations:

- Where lodgepole pine stands are suppressed and/or severely infected with disease, making them unmanageable with thinning.
- Where expansive stands of interior even-aged lodgepole pine occur, providing conditions conducive to bark beetle attack or wildfire.
- Where horizontal and/or vertical wildlife habitat diversity is lacking.

Ponderosa Pine Restoration

Acres: ~4,500 acres

Description:
These areas include most of the untreated, mapped ponderosa pine stand types. Stands mapped as ponderosa pine are at least five acres in size and are comprised of at least 25 percent ponderosa pine on a basal area basis. These stands are given an additional treatment buffer to provide room for expansion. Part of the expansion would be realized immediately post-treatment by decreasing the percentage of lodgepole pine and increasing the relative percentage of ponderosa pine. Part of the expansion would occur over time with natural recruitment of ponderosa pine regeneration in the newly created space vacated by removing competing lodgepole pine.

Objectives:
1. Use silvicultural treatments to improve the health and increase the dominance of existing ponderosa pine stands. The historic condition, structure and range of ponderosa pine on these sites will be used as a guideline for restoration treatments.
2. Protect ponderosa pine from the effects of high-intensity wildfire by reducing the number of trees per acre, crown bulk density, and ladder fuels.

Prescription:
- Treat 50 to 60 percent of stands with pre-commercial thinning and commercial thinning to increase the dominance of ponderosa pine.
- Remove lodgepole pine up to 16 inches dbh, especially when they are competing with ponderosa pine.
- Do light understory thinning of ponderosa pine in areas of high stocking (thin to 15 – 20 ft spacing).
- Maintain structural diversity of ponderosa pine, and retain all lodgepole pine greater than 16 inches DBH and all ponderosa pine greater than 16 inches DBH.
- Radius thin out to 50 feet from around mature and old-growth ponderosa pine and focus on removing lodgepole pine and retaining large size trees.
- Maintain hiding cover on at least 40 percent of the stand in areas selected by the wildlife biologist.
- Wildlife cover patches should be located such that patches are within 1200 feet of each other and are no smaller than 6.5 acres in size.
- Unit U64 would only be treated with a radius thin. Radius thinning would occur around the mature and older ponderosa pine trees that are 12 inches in diameter and larger.
- Unit FTU24 would only be treated in the first band for fuels. In the rest of the unit treat with a radius thin. Radius thinning would occur around the mature and older ponderosa pine trees 12 inches in diameter and larger.

Wildlife Habitat Emphasis

Acres: ~19,345

Description:
The proposed project areas contain mainly lodgepole pine communities that are in various stages of development (e.g. young to mature stands with a mixture of densities). Some species of focus that use these stands include (but are not limited to): black-backed woodpecker, northern

goshawks, mule deer and elk. Identified blocks are 400 acres and larger which can be maintained long-term as contiguous habitat. Smaller areas in key cover patches were also delineated adjacent to Crescent Creek, the Little Deschutes River, and when surrounded by industrial forestland.

Objectives:

1. Promote healthy and vigorously growing stands of trees
2. Develop and/or maintain structural diversity
3. Develop and/or maintain a mosaic of forest conditions ranging from relatively dense stands to relatively open-growing stands of trees.

Prescription for Remnant Mature Stands:

- Treat up to 60 percent of each unit with a variety of density management prescriptions EXCEPT in those stand portions that lie within Band 1. Density management prescriptions will be similar to the following guidelines:
    - Thin 10 to 20 percent of the area to a wide spacing that would retain 20-30 trees per acre;
    - Thin 20 to 30 percent of the area to a moderately wide spacing (30 ft. spacing between trees) that would retain 40 -50 trees per acre;
    - Thin 20 to 30 percent of the area to a moderately close spacing that would retain 70-90 trees per acre (20 ft. spacing between trees.
- Retain at least 40 percent of dense cover per unit untreated for wildlife cover areas, with the exception of thinning around a few mature and old-growth pine trees. Cover areas will be within 1,200 feet of each other, at least one acre in size and will contain some of the densest and more mature stands available to provide suitable habitat for a variety of wildlife species (e.g., hiding cover for deer and elk and foraging and nesting habitats for black-backed woodpeckers).
- Thin out to 50 feet from around mature and old growth ponderosa pine trees and focus on removing young lodgepole pine and retaining large size trees (12 inches in diameter and larger)
- Retain adequate amounts of large snags and large downed logs. Where large snags and/or large logs are absent, retain additional trees that would otherwise be thinned for recruiting snags and logs. Trees retained for snag and down log management will be selected from the largest available trees that would otherwise be harvested.

Meadow/Riparian Restoration

Acres: ~3,120 acres

Description:

These are stringer meadows and riparian areas associated with streams, Little Deschutes River, ditches, and high water tables. Some of these wet meadows and adjacent wet lodgepole stands are remnants of pre-Mazama streams and riparian zones, and some are being sustained by intermittent flowing irrigation ditches. This category also includes approximately a 200-300 foot wide strip of the adjacent forest on either side that has wetland hydrologic/soil influence now, or at some point in the past 150 years.

Objectives:

1. Thin smaller diameter ponderosa pine to promote growth of large trees and increase shrub/grass component in understory
2. Promote growth of large trees for input to stream as LWD
3. Reduce potential for catastrophic wildfire adjacent to rivers and within riparian area
4. Maintain larger trees and understory to provide shade, bank stability, and maintain channel function over the long term
5. Promote habitat for riparian dependent species
6. Maintain healthy functioning meadow habitats that currently exist and restore habitats that have been lost or negatively impacted by pine expansion and motorized travel
7. Maintain and create habitat diversity where opportunities exist for species that use meadows, but reside in adjacent forest habitats (e.g., retain or create snags and logs in meadows or at meadow's edge for great gray owls).

Prescription:

- Within pine dominated units that are not specifically addressed below:
  A. Units located on outside of meander bends – zone between active channel (edge of floodplain) extending out approximately 75-150 ft., thin pine ≤6" dbh . Zone beginning approximately 150 ft. from the active channel extending out to approximately 300 ft, thin pine ≤10" dbh or use proposed Rx, whichever leaves more trees/acre.
  B. Units located on inside of meander bends - Zone between active channel extending out approximately 75-150 ft., thin pine ≤6" dbh. Zone beginning approximately 150 ft. from the active channel extending out to approximately 200 ft, thin pine ≤10" dbh or use proposed prescription, whichever leaves more trees/acre.
  C. Units located on dynamic segment with potential chute cutoffs and oxbows - Zone between active channel extending out approximately 250-300 ft., thin pine ≤6" dbh.
- Meadows/riparian areas in grazed allotments should be rested at least one year prior to burning and one year post-burn.
- Kill most pines trees within existing and historical meadow habitats
- Retain large snags in and at the edge of the meadow treatment areas and retain large logs typically at the edge of meadow treatment areas (logs probably are not present in the middle of existing meadows and the objective is not to drag logs from the forest into the meadow)
- Pre-treat stand edges by hand or machine cutting or masticating followed by prescribed fire
- Retain some trees where there is evidence (stumps, topography, etc.) that trees may have grown there naturally.

Planning Area Proposed Five-Year Treatment Schedule

FY 07

Priority	Treatment Area/Unit(s)	Acres	FY07 Fall/Winter	FY07 Spring/Summer	FY08 Fall/Winter	FY08 spring/summer
1	Burgess/FTU29-32	360	Thin (CT/PCT)	Pile	Burn Piles	Mow brush
2	Stagecoach/	500	Thin (CT/PCT)	Pile	Burn Piles	Mow brush
3	La Pine SP/ROW-2, SD Buff 1 and 2	500	Thin (CT/PCT)	Pile	Burn Piles	Mow brush
4	Prairie/FTU5,33,46,47 and TH3-4	1,000	Thin (CT/PCT)	Treat Slash	Broadcast Burn	
5	Doe/FTU24 and TH7	500	Thin (CT/PCT)	Pile	Burn Piles	Broadcast
6	Newberry Estates/FTU1	40	Broadcast Burn		treat (Rx fire)	

FY08

Priority	Treatment Area/Units(s)	Acres	FY08 Fall/Winter	FY08 Spring/Summer	FY08/09 Fall/Winter	FY09 Spring/Summer
1	La Pine SP/Admin-2-5	500	Thin (CT/PCT)	Pile	Burn Piles	Mow brush
2	Darlene/FTU27,28	2,200	Thin (CT/PCT)	Slash Treatment	Broadcast Burn	
3	Dusty/FTU2	1,800	Thin (CT/PCT)	Slash Treatment	Mow brush	Broadcast Burn
4	By-Way/FYU6	2,800	Thin (CT/PCT)	Pile	Burn Piles	Mow brush
5	Babb/FTU17-19	850	Thin (CT/PCT)	Slash Treatment		
6	Ringo/FTU21	1,800	Thin (CT/PCT)	Slash Treatment	Broadcast Burn	

FY 09

Priority	Treatment Area/Unit(s)	Acres	FY09 Fall/Winter	FY09 Spring/Summer	FY09/10 fall/winter	FY10 Spring/Summer
1	Riverview/FTU48-50	600	Thin (CT/PCT)	Pile	Burn Piles	Mow brush
2	Wildcat/FTU40 and TH02	200	Thin (PCT)	Pile	Burn Piles	Mow brush
3	La Pine State Park/ROW-5, FTU-5	500	Thin (CT/PCT)	Slash Treatment	Broadcast Burn	
4	HWY 97/FTU57	1,000	Thin (CT/PCT)	Pile	Burn Piles	Mow brush

FY10

Priority	Treatment Area/Unit(s)	Acres	FY10 Fall/Winter	FY10 Spring/Summer	FY10/11 fall/winter	FY11 Spring/Summer
1	La Pine State Park/FTU-1	300	Thin (CT/PCT)	Pile	Burn Piles	Mow brush
2	Dog Hair/FTU23 and MR13	1,500	Thin (PCT)	Slash Treatment	Broadcast Burn	

FY 11

Priority	Treatment Area/Unit(s)	Acres	FY10 Fall/Winter	FY10 Spring/Summer	FY10/11 fall/winter	FY11 Spring/Summer
1	Eastside Riparian/MR15	600	Thin (CT/PCT)	Slash Treatment		Broadacast Burn

Appendix B – Wildlife

Under the Upper Deschutes Resource Management Plan the La Pine geographic area was given three different land use allocations in regards to wildlife resources: primary, secondary and general wildlife emphasis. In the northern portion of the La Pine geographic area there is a primary wildlife emphasis for elk winter range, deer migration corridor, ponderosa pine and riparian source habitats. In the isolated parcels along the Little Deschutes River there is a primary emphasis for riparian habitats, deer migration, elk winter range and raptor nesting and foraging habitats. In the southern area there is a primary emphasis for deer migration corridor, ponderosa pine and riparian source habitats. The Rosland OHV Play area and areas south and east of the Play Area have a general wildlife emphasis.

The applicable guidelines for managing for a primary wildlife emphasis in this area include: habitat effectiveness should advance toward 70 percent or greater; where possible, maintain large un-fragmented habitat patches (1,000 to 2,000 acres); where possible manage for low densities of open motorized travel routes (approximately <1.5 mi/mi^2; rate as a high priority for habitat restoration; and use seasonal closures where necessary.

The main issues facing wildlife and resource management activities in the La Pine area includes negative effects on mule deer hiding cover and forage; habitat fragmentation due to roads and changes in forest stand size and structure (including management of snags and down logs); overstocking of trees and high fuel loads in ponderosa pine habitats and conifer encroachment into meadow and riparian habitats.

Species of Focus

Many wildlife species can be found in the proposed project area. For example, Thomas et al. (1979) identified 93 species that feed and 63 species that reproduce in lodgepole pine; and 154 species that feed and 112 species that reproduce in ponderosa pine plant communities of the Blue Mountains in Northeastern Oregon. While BLM lands contain a small amount of river and stream riparian habitats in the La Pine area, these habitats are very important to many species and are considered a special or unique habitat type. Thomas et al. (1979) identified 256 species that feed and 192 species that reproduce in river; and 254 species that feed and 182 species that reproduce in stream habitats. This analysis focuses on priority wildlife species called "Species of Focus." Species of Focus are vertebrate species for which there is ongoing concern about population or habitat status. For this planning effort species were included if they met either of two criteria:

- Species that are included in the Special Status Species Policy (6840) which includes: federally listed threatened, endangered, proposed or candidate species, Bureaus Sensitive, Assessment or Tracking Species and State listed species.
- Species of local interest, such as deer and elk.

Bald Eagle

Bald eagles are federally listed as a Threatened species and are the only federally listed or proposed species in the project area. The eagle's present status is a result of destruction of

habitat, harassment and disturbance, shooting, electrocution, poisoning, a declining food base, and environmental contaminants.

Detailed accounts of habitat requirements of the bald eagle may be found in the Pacific Bald Eagle Recovery Plan (USDI FWS 1986). Bald eagle nesting territories are normally associated with lakes, reservoirs, or rivers. Nests are usually located in large conifers (e.g., ponderosa pine) in uneven-aged, multi-storied stands with old-growth components (Anthony et al. 1982). Nest trees usually provide an unobstructed view of the associated water body. Live, mature trees with deformed tops are often selected for nesting. Bald eagles often construct several nests within a territory and alternate between them from year to year. Snags, trees with exposed lateral branches, or trees with dead tops are often present in nesting territories and are used for perching or as points of access to and from the nest.

The Recovery Plan designated Recovery Zones for each state. The proposed project is located in Recovery Zone 11 - High Cascades. The main threats identified by the Recovery Plan for Zone 11 are recreation disturbance, logging, shooting, and trapping. However, since the plan's approval, new habitat issues have evolved: in recent years, large potential nesting or roosting trees (e.g., ponderosa pine and Douglas-fir) have been significantly impacted by insect, disease, blow-down, wildfire, and timber harvest.

Currently there are no bald eagle nests located on BLM administered land in the La Pine area. However, there is one territory (Bates Butte) with two nest sites identified within one mile of BLM land and close proximity to proposed treatment units. Of these two nest sites, only one is known to exist (and is currently active) and is located within 0.22 miles of a proposed treatment unit. The other nest site was located within 0.24 miles of a proposed treatment unit, but the nest has not been located in over 5 years. In the analysis area there are approximately 50 acres of old growth ponderosa pine on BLM (including the La Pine State Park), but often it occurs in small groups of trees rather than in stands of trees, therefore generally cannot be measured on an acreage basis. Some of the old growth ponderosa pine could be considered suitable for bald eagles to nest in. However, bald eagles tend to nest within one mile of a significant water source and some of this habitat is located over one mile from a significant water source. Additionally, some of these trees are located where there is constant human activity (e.g., recreation in La Pine State Park) which may make them less desirable for eagles.

Often the old growth ponderosa pine trees are located in areas with high tree densities and fuel loadings and with ladder fuels that would allow fire into the canopy if a fire were to occur. The high tree densities and fuel loadings are currently putting stress on and endangering the existence of the old growth ponderosa pine.

Oregon Spotted Frog

The spotted frog is a Federal Candidate Species that are associated with relatively large wetland complexes. They breed in shallow, relatively un-shaded emergent wetland ponds, which are typically dry by mid- to late summer and range in depth from 2 to 14 inches during the breeding season. After breeding, adults disperse into adjacent wetland and riparian habitats. Adults remain active year-around near sea level, but freezing temperatures apparently cause adults and juveniles to hibernate in streams, oxbows and springs at higher elevations.

The Oregon spotted frog once occurred from southwest British Columbia through western Washington and Oregon into northeastern California. Today the species is known from 3 localities in British Columbia, 4 localities in Washington and approximately 24 localities in Oregon.

Causes for the decline of the Oregon spotted frog, include loss of habitat from altered hydrology due to agriculture, urbanization and water development; predation by exotic fish and amphibians, and physiological effects from changes in water chemistry and ultraviolet radiation (Watson et al. 2000, USDI FWS 2002). Other probable causes for decline are pesticides, fertilizers and other chemicals, which find their way into spotted frog habitat (Programmatic Biological Assessment, USDA Forest Service and USDI Bureau of Land Management, 2003-2006).

Areas of the Upper Deschutes Watershed where Oregon spotted frogs have been observed include: Little Deschutes River, Crescent Creek, Long Prairie Creek, Paulina Lake, headwaters of the Deschutes River, Snowshoe Lakes, Crane Prairie Reservoir, Wickiup Reservoir, and the Deschutes River between the reservoirs, Little Cultus Lake Marsh, Big Marsh Creek, Odell Creek, and Davis Lake.

Mule Deer

The public has a high level of interest in mule deer for hunting and viewing (Wallmo, 1981). However, in some suburban and agricultural areas, deer can cause problems when they feed in home gardens, and browse residential shrubs.

In general, higher elevations are used as summer ranges and areas below 4,500 feet are considered winter range. Seasonal movements and routes can be critical to maintaining migratory habitat. The value of timberland for deer is proportional to the degree that it is broken and interspersed with openings. Deer numbers on forested lands are usually highest where openings that support low-growing palatable shrubs and forbs are scattered through the forest.

The mule deer migration corridor in the La Pine area receives use by 21,500 migrating mule deer annually (ODFW, 2001). Mule deer descend from summer range on the eastern slopes of the Cascades to their lower elevation winter ranges. Use is concentrated in the area immediately south of Lava Butte near the La Pine State Park and between La Pine and Gilchrist. Mule deer populations are presently below ODFW management objective numbers.

Of the lodgepole pine and ponderosa pine communities that are on BLM, 16,204 acres currently provides suitable hiding cover conditions for mule deer in the migration corridor. This represents 43 percent of the BLM lands which grow forest conditions capable of providing hiding cover. In the northern high use corridor there are 1,012 acres (25 percent) and in the southern high use corridor there are 12,170 acres (45 percent) of hiding cover on BLM administered lands. A minimum cover to forage ratio of 30 to 70 was set in a Memorandum of Understanding with ODFW in 1990 to protect deer, elk, and pronghorn migratory habitat. Desired cover to forage ratios are documented at 40 to 60 by Thomas *et al.* (1979) and at 45 to 55 by Leckenby *et al.* (1982).

Rocky Mountain Elk

Elk can be found throughout the planning area in all vegetation types. Elk are considered grazers and mainly feed on grasses. During the spring and summer, elk forage on a variety of plants including forbs and grasses, and in the winter, they use bitterbrush, grasses, and agricultural stubble.

Elk numbers have been increasing in the La Pine area during the past 10-12 years. The Brothers/La Pine FEIS/PRMP states that in 1982 the number of elk was around 70 animals. Currently 150 to 200 elk reside in and around the La Pine and frequently cross U.S. Highway 97 because the most dependable water sources are the Little Deschutes River, wet meadows, and springs located west of the river. Timber harvests in the project area have created some favorable cover to forage ratios encouraging the elk to stay in the area. Elk use the same corridors as deer in areas with sufficient connective habitat. Guidelines recommending a ratio of 40 percent hiding and thermal cover to 60 percent forage area have been widely accepted as optimal for elk (Toweill and Thomas, 2002).

In general, ungulates respond to recreational activities by avoiding areas near roads, recreation trails and other types of human activities (Gaines, et al. 2003). Shifts in elk distribution away from roads used by motorized vehicles have been documented across many areas of the western United States (Rowland, et al. 2000). Roads and associated disturbances have been presumed to be the primary agent driving elk distribution across seasons and landscapes. To better quantify this relation, an elk-road density model was developed (Thomas et al. 1979, Lyon 1983) that has been used extensively throughout the intermountain west as a component of elk habitat effectiveness models (Rowland et al. 2000). There are numerous types and quantities of motorized travel routes in the proposed project area. Many of these roads are improved travel routes and not under the jurisdiction of the BLM. Throughout the analysis area (including elk winter range and deer migration routes) habitat effectiveness on BLM administered lands never scores above 22 percent and averages over 7 miles of open roads per square mile of land.

In the La Pine area BLM manages approximately 26 percent (28,873 acres) of elk winter range. Of this elk winter range nine percent (2,560 acres) are managed with a primary wildlife emphasis (including guidelines for elk) and is located in the northern mule deer migration corridor. Of the 2,560 acres of BLM-managed elk winter range in the northern migration corridor, 32 percent (810 acres) currently provides suitable hiding cover and 68 percent (1,750 acres) is currently suitable foraging habitat. In the La Pine State Park there are an additional 2,296 acres of elk winter range, of which 78 percent (1,800 acres) is suitable cover and 22 percent (496 acres) is suitable foraging habitats. Most of the remaining elk winter range is located in the southern mule deer migration corridor, where elk is not a primary emphasis.

In general, ungulates respond to recreational activities by avoiding areas near roads, recreation trails and other types of human activities (Gaines, et al. 2003). To better quantify this relation, an elk-road density model was developed (Thomas et al. 1979, Lyon 1983) that has been used extensively throughout the intermountain west as a component of elk habitat effectiveness models (Rowland et al. 2000). There are numerous types and quantities of motorized travel routes in the proposed project area. Many of these roads are improved travel routes and not under the jurisdiction of the BLM. Throughout the analysis area (including elk winter range and

deer migration routes) habitat effectiveness on BLM administered lands never scores above 22 percent and averages over 7 miles of open roads per square mile of land.

Source Habitats

Lodgepole Pine/Ponderosa Pine

The proposed project area is made up mostly of lodgepole pine plant communities which are in a series of different seral stages and structural conditions. Ponderosa pine and riparian (with meadow) communities are also present and exist in a variety of conditions. The proposed projects are located on BLM-administered lands that are situated in a mixed ownership pattern of private, state and Forest Service administered lands. The private lands consist of urban dwellings, schools and businesses, ranches and industrial forest lands. The public lands includes the BLM lands which are arranged in small to moderately large size parcels (40 to 4,000-plus acre patches); the La Pine State Park (medium size-2,523 ac) and Forest Service lands which are made up of large continuous lands and generally surround the entire project area.

In the La Pine area BLM administers approximately 40,200 acres. Of these lands approximately 38,061 acres grow lodgepole and ponderosa pine forest conditions. These plant communities are dynamic systems that are always moving through stages of development which are influenced by nature and man. Most of the forests contain lodgepole pine but there are some small stands and scattered clumps of ponderosa pine mixed in. Recent silvicultural treatments have removed many lodgepole pine trees from stands with a fair amount of ponderosa pine in an effort to manage some areas for ponderosa pine communities. Because ponderosa and lodgepole pine often grow together in a mix there is little data available to describe the amounts and locations of pure stands of either species. Therefore, the following description groups the two species together. Of the lodgepole and ponderosa pine communities located on BLM lands 13 percent (5,078 ac.) are in the early seral stage of seed-sapling; 54 percent (20,590 ac.) are in the sapling-pole stage; 30 percent (12,129 ac.) are in the mature stage and less than one percent (264 acres) are in an old growth stage. Lodgepole pine generally do not exist in an old growth state and tend to die at the mature stage due to insect invasions or stand replacing fires that kill large stands returning them back to an early seral state.

Riparian/Grass-Meadow

Because of their proximity to water, the plant species present in riparian areas often differ considerably from species found in the adjacent uplands. The riparian areas within the planning area represent only a small percentage of the total planning area but are important for the overall health of a system. A functioning riparian zone provides fish and wildlife habitat, protects water quality, stabilizes stream banks, aids groundwater recharge, assists in flood control, and provides visual esthetics and recreational opportunities.

Most of the riparian habitats on BLM administered lands are located along the Little Deschutes River, but there is some along Crescent Creek and a few irrigation canals. These areas contain a complex mosaic of riparian habitats on broad flood plains, including broad meadow areas composed primarily of sedge, rush, and/or grass communities with scattered willows and other woody riparian species. Adjacent to the Little Deschutes River and its oxbows, there are dense

willow communities interspersed with wet meadows encompassing a wide variety of emergent and flood tolerant species of vegetation.

There are an additional 2,124 acres of grass meadow habitats associated most often with 29 miles of river/creek riparian communities. Some of the grass-meadows have young lodgepole pine and ponderosa pine expanding into them which is changing the plant community from meadow to forest.

Environmental Consequences

This section describes the general effects of proposed vegetation treatments on species of focus and source habitats. Species of focus discussed in this analysis are bald eagles, spotted frogs, mule deer and Rocky Mountain elk. Source habitats (also described as plant communities) discussed include lodgepole pine/ponderosa pine and riparian/grass-meadow. The assessment of source habitats allows us to display effects on groups of wildlife species where effects would be similar, rather than repeating similar information for a large number of individual species.

The project area contains no habitat designated “critical” or “essential” for Federally-listed species.

The proposed project would change the density and structure of the forest vegetation across approximately 27,710 acres on BLM administered lands in the La Pine area.

Species of Focus

Bald Eagle

The proposed action of thinning young trees and mechanically reducing the amount of fuel loadings around old growth ponderosa pine trees would have a beneficial affect to the old growth ponderosa pine trees and potential bald eagle habitats. Prescribed burning could have both positive and negative effects to bald eagle habitats. Prescribe burning which reduces fuel loadings around old growth trees would improve the health and security of the remaining trees, however there would be some risk of fire killing a few of the trees. Cutting and pulling away trees and shrubs from around the old growth trees would improve the likelihood of the trees surviving the burn.

Project design criteria such as seasonal restrictions and distance buffers would ensure bald eagles would not be disturbed during nesting season. Also, prescribed fire managers would use smoke management forecasts to minimize smoke entering into suitable habitat and to ensure that dissipation of smoke would be adequate. Some of the prescribed burning would occur in the fall outside of the nesting season.

Oregon Spotted Frog

The proposed action could have some short-term negative effects with long-term beneficial effects on spotted frog habitats. The proposed meadow restoration treatments include prescribed fire which could remove some vegetative cover around wetland habitats making the frogs more exposed to predation in the short-term. However, by removing forest vegetation from meadows the proposed action should help maintain or improve suitable riparian habitats by removing trees

from the riparian areas. This should aide in maintaining relatively un-shaded emergent vegetation where spotted frogs breed.

There should be no direct effect to breeding habitat because breeding occurs in shallow, relatively un-shaded emergent wetlands and breeding ponds, which won't burn during the breeding season. Additionally, because adults are highly aquatic and are seldom found far from water there should few to no direct mortality of adults.

PDC are designed to protect and maintain ponds, lakes, sloughs, wet meadows, and other wetlands, high channel complexity and stability, abundance and diversity of side channel habitats, water quality, low levels of fine sediment, in-stream wood, and wood recruitment. The criteria are also designed to protect and maintain hydraulic regimes and temperatures that are consistent with unaltered basins, and maintain, restore, and open connective corridors to spotted frog suitable habitat. By implementing the following PDCs the proposed project should have minimal short-term negative effects and have long-term positive effects to spotted frogs and riparian habitats.

Project Design Criteria for Oregon Spotted Frogs

A. Do not fragment or convert wetland habitat to upland habitat through management activities including, but not limited to, water diversions, road construction, maintenance, or recreational facilities expansion. Where possible restore wetlands.

B. Do not degrade wetland habitat or water quality.
   1. In channel, lake, or shoreline digging would be for restoration only.
   2. Comply with the following Bull Trout, Steelhead Trout, and Chinook Salmon EFH Project Design Criteria:
      (c) Sediment and Substrate 1, 2, 3, 6, 7, 8, 9, and 10.
      (d) Bank Stability 1 and 2.
      (g) Livestock Grazing 3, 4, and 5.

C. Changes in hydrology of a stream, spring, lake, or wetland should be for restoration purposes only.
   1. In reservoir situations, where possible, allow maintenance or development of shallow water habitat with emergent vegetation through July to provide egg laying and development.
   2. When removing or modifying stream barriers to allow for fish passage, do not risk the introduction of non-native species.

D. Limit activities within the channel migration zone or 100-year floodplain to those that have either a neutral or beneficial effect on floodplain functions. Timing of those activities will be outside egg laying/hatching for that area. If not known, restrict activities from March 1 to May 31.

E. Connectivity will be maintained through properly functioning streams, marsh, in stream, and floodplain vegetation. Restore native sedges, rushes, and willows where possible and appropriate.

F. Use of pesticides, herbicides, and similar potential contaminants are prohibited in and immediately adjacent to wetland habitat. Applications of these chemicals should be conservative when estimating drift to avoid any contamination.

Mule Deer

The proposed project would consider changing the density and structure of the forest vegetation across approximately 27,710 acres on BLM administered lands in the La Pine area. However, in each treatment area approximately 40 percent of the existing hiding cover would be retained. All of the treatments are proposed to occur within the mule deer migration corridor, but not all of the treatments would be in suitable hiding cover. Also, some areas are old meadows that are being taken over by pine trees and the proposed action is to restore the meadow. Commercial thinning would occur on 3,538 acres of suitable hiding cover of which 454 acres would be located in the northern high-use migration corridor on BLM administered lands. Currently, 25 percent (1,012 ac.) of the northern high-use migration corridor provides suitable hiding cover. Commercially thinning approximately 454 acres of hiding cover would change the suitability of the vegetation so that it would not provide hiding cover resulting in 14 percent (558 ac.) available hiding cover in the northern high-use migration corridor after harvests.

Pre-commercial thinning and prescribed fire are proposed on the commercial thinning units would continue to degrade what cover would be left after the thinning, but would not affect any other additional cover except for areas located in a meadow restoration treatment.

There would be an additional 707 acres of commercial thinning in the La Pine State Park where there is approximately 80 percent (1881 ac.) existing hiding cover. The commercial thinning would change the suitability of the vegetation so that it would not provide hiding cover resulting in 50 percent (1174 ac.) available hiding cover in the northern high-use migration corridor on State Park Lands. Pre-commercial thinning and prescribed fire are proposed on an additional 802 acres of hiding cover in the State Park which would continue to decrease the amount of hiding cover to 16 percent in the La Pine State Park.

In the southern migration corridor the proposed action remove approximately 6,920 acres of hiding cover including 1,602 acres in commercial thinning units. The proposed treatments would drop the amount of hiding cover from 45 percent (12,170 acres) to 19 percent (5,250 acres).

These vegetative treatments would temporarily change the suitability of the hiding cover. Because the forest thinning would open the forest floor to greater amount of sunlight and competition for resources, the ground vegetation would respond positively and begin to grow and fill in the forest gaps created by the thinning. In 10 to 20 years the thinned areas would likely provide suitable hiding cover conditions again in many of the treated areas.

The existing road densities in the project areas are above desired levels when managing for deer. The proposed actions would not increase the amount of designated roads, however by decreasing the amount of trees, shrubs and down logs the proposed action would increase the openness of the forest communities which would allow easier motorized access into the areas off of designated roads. Additionally, forest thinning operations will create temporary skid roads which then could be more visible and accessible to the general public.

Rocky Mountain Elk

The proposed action would have both positive and negative effects on elk habitats. For example, thinning out dense lodgepole pine and ponderosa pine stands would allow greater sunlight to the forest floor and increase the amount of forage for elk. However, removing forest cover from thinning would reduce the amount of hiding cover which elk also need, especially during autumn. Land management guidelines of 40 percent hiding and thermal cover to 60 percent forage area have been widely accepted as optimal for elk (Toweill and Thomas, 2002). In the La Pine area, currently the cover to forage ratio is 57 percent (62,907 acres) cover to 43 percent (67,067 acres) forage on all ownerships.

The proposed action would increase the amount of forage on approximately 8,742 acres from thinning and prescribed burning. The proposed action would also negatively affect of elk winter range by reducing the amount of hiding cover, especially in the northern migration corridor where there is a primary wildlife emphasis for managing for elk habitats. In elk winter range located in the northern migration corridor the proposed action would remove 267 acres of cover reducing the amount of cover from 32 percent to 21 percent (543 acres).

The existing road densities in the project areas are above desired levels when managing for elk. The proposed actions would not increase the amount of designated roads, however by decreasing the amount of trees, shrubs and down logs the proposed action would increase the openness of the forest communities which would make motorized travel more accessible to off-road travel. Additionally, forest thinning operations would create temporary skid roads which would be more visible and accessible to motorized travel.

For effects on elk habitats in the southern migration corridor see the effects description for mule deer because the elk winter range is completely within the mule deer migration corridor and the effects would are similar.

Source Habitats

Lodgepole Pine/Ponderosa Pine

The proposed action would decrease the amount of lodgepole pine forest communities and increase the amount of ponderosa pine forest communities on approximately 4,500 acres where there is a fair amount (at least 25 percent of the stand) of ponderosa pine. By removing most of the lodgepole pine the habitat type would be changed from a relatively closed canopy mixed lodgepole/ponderosa pine habitat to a more open canopy ponderosa pine community. This action would change the suitability of these forest habitats for some species of wildlife. For example, five species of birds (e.g., northern goshawk, great gray owl, three-toed woodpecker, black-backed woodpecker, and pine grosbeak) are closely associated with lodgepole pine forests, while

there are 13 species of birds closely associated with ponderosa pine forests. Only two of these species (northern goshawk and great gray owl) are found to be closely associated with both plant communities. However, because the proposed action would decrease the canopy cover in these forest stands the resulting conditions may not be suitable for all species that would be found in a ponderosa pine forest that typically have a higher canopy closure. For example, goshawks typically nest in forests with a high canopy cover, but will generally use open forests (with a low to medium amount of forest cover) for foraging.

Riparian/Meadow

The proposed action would maintain or help restore 550 acres of meadow habitats mostly located along the Little Deschutes River. There are approximately 30 species of birds (e.g., great blue heron, yellow warbler, great gray owls) that are closely associated with meadows that would benefit from maintaining and increasing the amounts of healthy riparian and meadow habitats. Other species that depend on forest habitats would be negatively affected as there would be a decrease in the amount of forest communities

Cumulative Effects to Wildlife and Source Habitats

Bald Eagle

In February of 2006, the U. S. Fish and Wildlife Service proposed to remove the bald eagle from the list of endangered and threatened wildlife because current data indicate that the bald eagle in the lower 48 states has recovered. In the Pacific Recovery Region, where the proposed project is located, the recovery goals have been met since 1995. The proposed rules stated "adequate habitat is available to support existing bald eagles and to ensure future population growth" (Federal Register / Vol. 71, No. 32 / Thursday, February 16, 2006 / Proposed Rules).

The Deschutes NF LRMP (USDA FS 1990a) identified Bald Eagle Management Areas (BEMAs), which have specific requirements for maintenance and protection of eagle habitats. A total of 19,800 acres are included in 40 BEMAs across the action area. They range in size from 17 to 3,228 acres with an average size of 509 acres. There are specific standards and guidelines in the Deschutes NF LRMP that provide management direction for BEMAs.

The BLM manages little habitat with the potential for bald eagle nesting habitat. There is some potential habitat located on private lands, however, most of the significant water features are located on adjacent Forest Service land.

Cumulative effects of combined activities on BLM-administered lands and actions on other lands in the project area, and immediately adjacent areas, are expected to result in an improvement in bald eagle habitat quality.

Oregon Spotted Frog

In and immediately adjacent to the project area there are approximately 33 miles of river and stream riparian habitats on Forest Service; 8 miles on State and 178 miles on private lands. Forest Service follow standards and guidelines within riparian reserves that would help maintain and improve habitat conditions. Riparian areas within the State park are managed for recreation and scenic qualities which would not directly negatively impact habitat quality. Management

and land uses on private lands vary across individual ownerships and likely have negative, positive and benign effects to habitat quality. Data on private land practices is not currently available.

Cumulative effects of combined activities of the proposed action on BLM-administered lands and actions on other lands in the planning area, and immediately adjacent areas, are expected to result in the maintenance of spotted frog habitat quality and quantity.

Mule Deer

Northern High-Use Migration Corridor- Of the land capable of providing hiding cover in the northern high-use mule deer migration corridor the Forest Service manages 42 percent (6,923 acres) of which 75 percent are currently suitable; the State Park manages 14 percent (2,359 acres) of which 76 percent are currently suitable; and private landowners manage 20 percent (3292 acres) of which 65 percent are currently suitable. However, the above calculations do not include recent fuels treatment activities that have taken place over the last several years.

When managing vegetation resources the Forest Service consults ODFW and mitigates negative effects of their land management actions on wildlife resources. The La Pine State Park, in coordination with the BLM manages most of the forest resources in the park and BLM consults ODFW and mitigates negative effects of land management actions on wildlife resources. Private land in the northern migration corridor is broken into many small parcels and many are home sites with limited ability to contribute to hiding cover. Roads, driveways, OHV trails, fences and dogs are a few negative effects related to the private lands.

Southern High-use Migration Corridor- Of the land capable of providing hiding cover in the southern high-use mule deer migration corridor the Forest Service manages six percent (5,084 acres) of which 78 percent are currently suitable; the State Park manages no acres; and private landowners manage 62 percent (52,986 acres) of which 61 percent are currently suitable. However, the above calculations do not include recent fuels treatment activities that have taken place over the last several years. Also, some home sites have suitable vegetation that keys out as exisitng hiding cover, however, because of dogs, fences and frequent motorized vehicle traffic some of these areas may not be provide suitable conditions for mule deer use.

Entire Migration Corridor- Of the land capable of providing hiding cover in the entire mule deer migration corridor the Forest Service manages 23 percent (38,877 acres) of which 63 percent are currently suitable; the State Park manages one percent (2,359 acres) of which 76 percent are currently suitable; and private landowners manage 53 percent (90,720 acres) of which 65 percent are currently suitable. However, the above calculations are estimates of existing suitable hiding cover and do not include recent fuels treatments or other activities that have taken place over the last several years.

Rocky Mountain Elk

Of the land capable of providing hiding cover in the entire elk winter range in the analysis area the Forest Service manages 16 percent (18,016 acres) of which 72 percent currently provides cover; the State Park manages 2 percent (2359 acres) of which 76 percent currently provides cover; and private landowners manage 55 percent (60,789 acres) of which 39 percent currently

provides. However, the above calculations are estimates of existing suitable hiding cover and do not include recent fuels treatments or other activities that have taken place over the last several years.

The existing road densities in the project areas are above desired levels when managing for elk. The proposed actions would not increase the amount of designated roads, however by decreasing the amount of trees, shrubs and down logs the proposed action would increase the openness of the forest communities which would allow easier motorized access into the areas off of designated roads. Additionally, forest thinning operations will create temporary skid roads which then could be more visible and accessible to the general public.

Elk Habitat effectiveness models can consider a number of habitat variables including the amount and arrangement of cover and forage areas and their locations relative to open motorized travel routes. The proposed vegetation treatments would negatively affect elk hiding cover as described for mule deer.

Appendix C - Hydrology

Hydrology

Based on flow data near La Pine from 1924-1987, average annual flows on the Little Deschutes River are approximately 208 cfs (cubic feet per second), with most of the flow occurring from March through August (Moffatt, et al, 1990). Sustained flows through the summer months are due to regulation by Crescent Lake since 1922. Numerous water diversions upstream from the gage site reduce the amount of flow recorded at the gage. Withdrawal of water from the Little Deschutes River at a maximum rate of 37.5 cfs occurs at the Walker Basin canal near La Pine (RM 56).

The Little Deschutes River in the vicinity of the project area is classified as an E-type channel that is relatively sinuous and has a low width/depth ratio (narrow and deep) as defined by Rosgen, 1996. Due to the wide floodplain characteristic of the Little Deschutes River, and the good condition of the riparian vegetation, the segments of the Little Deschutes River that flow through public land has the ability to disperse energy during high flows and store water within its floodplain.

The riparian and meadow plant communities typically found adjacent to the Little Deschutes River are dominated by willow, bog birch, sedges, rushes, and grasses. Small areas in the floodplain and in the oxbow channels are saturated with standing water for 8-9 months of the year. In the absence of fire, meadow edges are being encroached upon by lodgepole pine regeneration.

The headwaters of the Deschutes River originate from large springs which provide clear, cold water with a very stable hydrologic regime. However, as a result of water storage and diversion for irrigation, the stable flows have been replaced by lower flows during the winter storage months and higher flows during the summer irrigation season. This difference is most significant between Wickiup Dam and Fall River (USDA Forest Service and Oregon Parks and Recreation, July 1996). The regulation of flow contributes to accelerated erosion, decrease in wildlife habitat, decrease in scenic quality during the winter, and degradation of fish habitat. As a result, the Deschutes River is classified as an F-type channel (as defined by Rosgen, 1996), which is deeply incised into an alluvial valley and has a high width/depth ratio (wide and shallow).

Riparian vegetation along the Deschutes River is a combination of lodgepole pine and ponderosa pine; shrubs including spiraea, snowberry, alder, or willow; and forbs and sedges. There are several large willow/sedge meadows scattered within the reaches. Regulation of water from Wickiup has resulted in reduced riparian type vegetation on the outside of meander bends and increased widths of point bars on the inside of meander bends (USDA Forest Service and Oregon Parks and Recreation, July 1996).

Water Quality

Both the Upper Deschutes and Little Deschutes Rivers are considered water quality limited and are on the 2002 Oregon Department of Environmental Quality 303(d) stream list. The Table below shows the parameter and management concerns for which each stream is listed.

2002 listed water bodies and parameters, and 2004 Public Comment Draft Parameters

Waterbody	303(d) Listed Parameters	Area of impact
Upper Deschutes River	Within Vicinity of Project Area: Dissolved oxygen levels insufficient; Sedimentation, Turbidity, and stream temperature (17.8 degrees Celsius). Downstream of Project Area: Chlorophyll a (Chl*a*), Dissolved oxygen, Stream temperature, Sedimentation, Turbidity	• Water quality limited for dissolved oxygen, sedimentation, and turbidity from Wickiup Reservoir to the confluence with the Little Deschutes • Within and adjacent to the project area, the river does not meet the dissolved oxygen standard for salmon and trout spawning • water quality limited for turbidity, temperature, sedimentation, dissolved oxygen, and chlorophyll a (Chl*a*)
Little Deschutes River	Dissolved oxygen and stream temperature (17.8 deg C)	Does not meet the dissolved oxygen standard for fish spawning and rearing. Upstream from the project area, the river does not meet the temperature standard for trout rearing and migration and for spawning from September 1 – June 30

The Little Deschutes River is water quality limited for stream temperature and dissolved oxygen. Within and adjacent to the project area and continuing down to the confluence with the Deschutes River, the river does not meet the dissolved oxygen standard of 11mg/l for spawning and 8mg/l for rearing. Upstream from the project area, the river does not meet the temperature standard of 17.8 deg C for trout rearing and migration and 12.8 deg C for spawning from September 1 – June 30. Stream temperature is currently not a listed parameter for the river mile segments within the vicinity of the proposed project area. However, the 2004 Public Comment Draft includes stream temperature of 17.8 deg C for trout rearing as a parameter within the project area.

The Deschutes River is water quality limited for dissolved oxygen, sedimentation, and turbidity from Wickiup Reservoir to the confluence with the Little Deschutes (river mile segments within the vicinity of the proposed project area). Within and adjacent to the project area, the river does not meet the dissolved oxygen standard of 11mg/l for salmon and trout spawning. Although stream temperature is currently not a listed parameter for this segment of the Deschutes River, the 2004 Public Comment Draft for listed parameters includes stream temperature of 17.8 deg C for salmon and trout rearing. Downstream from the confluence with the Little Deschutes and outside of the project area, the river is water quality limited for turbidity, temperature, sedimentation, dissolved oxygen, and chlorophyll a.

According to the draft Water Quality Restoration Plan (USDA FS and USDI BLM, 2004), release of water from Wickiup Reservoir is linked to most water quality problems in the Deschutes River between the reservoir and Sunriver. Release schedules have scoured sections below the dam and have caused aggradation further down. The high volume released has prevented tributaries and springs from contributing to the natural thermal regime. Cold, nutrient rich water from the hypolimnetic release of Wickiup Reservoir preclude the natural riverine functions.

In the Little Deschutes subbasin, Crescent Lake has 86,050 acre-ft permitted storage on top of a natural lake and Paulina Lake is permitted 19,460 acre-ft of storage over a natural lake. Mid-summer base flows within Crescent Cr. are supplemented by irrigation releases from Crescent Lake for distribution of water to lands north of Bend by Tumalo Irrigation District. Diversions on private lands remove most of the routed discharge precluding connection with the Little Deschutes River during summer months. Crescent Creek routs discharges above the natural summer flow regime.

Flow regulation is the most important management action affecting width to depth ratios and channel formation within the Upper Deschutes and Little Deschutes subbasins. Release schedules have scoured sections below the dam and have caused aggradation further down. Increased discharge can increase channel widths, increasing width to depth ratios, exposing more surface area to insolation which contributes to increasing water temperatures.

Wild and Scenic Rivers and State Scenic Waterways

The Upper Deschutes River is a federally designated Wild and Scenic River, and a State Scenic Waterway. The project area falls within Segments 2 and 3 of the Wild and Scenic River which is classified as Recreational, and within Scenic and River Community Areas classifications for the State Scenic Waterway. Outstandingly Remarkable Values (ORVs) for Segments 2 and/or 3 of the Wild and Scenic River include: geologic, fishery, vegetation, wildlife, cultural, scenic, and recreation.

The Little Deschutes River has a 12 mile segment designated as Wild and Scenic located approximately 25 miles upstream of the project area.

Hydrology Effects of Proposed Action

On-site prescriptions for units located within riparian areas were not completed for this assessment, and will be completed during project implementation. However, the objectives for riparian areas and possible prescriptions would be applied during implementation of the project. Therefore, this effects analysis is based on the objectives and prescriptions as outlined in the *Objectives, Standards, and Guidelines for riparian and streams* (see below) associated with proposed units. In some site specific cases, a somewhat more aggressive treatment of vegetation may be warranted to better meet fuels objectives as demanded for safety reasons.

Large openings created by harvest or fire either within the riparian zone or in the uplands can affect water quality, quantity and channel dimensions and change the local fauna and flora of local streams and lakes. However, with implementation of this project, treatments within riparian areas would include thinning of small pine and prescribed burning that would retain

trees for shade, bank stability, sources of large woody debris (LWD), and habitat for riparian dependent species. The intent would be to improve riparian vegetative conditions and reduce the potential for large, catastrophic fires within the riparian area. The proposed riparian prescriptions would effectively support shade, intercept sediment, and provide LWD and allochthonous inputs to the rivers.

Based on the prescriptions and objectives of the project within riparian areas, it is likely that there will be some slight increase in solar radiation to stream channels. However, the amount would be immeasurable in terms of stream temperature and impacts to fish. Thinning of the smaller trees would allow for growth of larger, taller trees that would provide additional shade in the long term. Therefore, there would likely be no increase in stream temperatures for those streams that are currently water quality limited and are on the 303(d) list.

There would also possibly be a slight, short-term increase in sediment associated with harvest activities and prescribed burning. Due to the flat terrain, the amount reaching the river channels would probably be immeasurable and should not affect fisheries habitat. In the long-term, the increase in shrubs, grasses, and forbs in the understory as a result of the thinning would improve groundcover and result in less sediment entering the stream channels.

Riparian plant species possess adaptations to fluvial disturbances that facilitate survival and reestablishment following fires, thus contributing to the rapid recovery of many streamside habitats (Dwire and Kauffman, 2003). Prescribed burning within the isolated meadows, according to guidelines in Appendix A (above), would likely improve sedge and rush productivity as long as the plants are burned in the late summer or early fall when the plants are dormant. Sedges and rushes are the dominant species within the meadows including Beaked sedge, Baltic rush, and common spike rush. These species would establish after fire through seed and/or lateral spread by rhizomes (USDA, website).

Objectives, Standards, and Guidelines for riparian and streams associated with proposed units.

Objectives for units located within the Wild and Scenic River corridor or are adjacent to the Deschutes or Little Deschutes River:

1. Thin smaller diameter pine to promote growth of large trees and increase shrub/grass component in understory
2. Promote growth of large trees for input to stream as LWD
3. Reduce potential for catastrophic wildfire adjacent to rivers and within riparian area
4. Maintain larger trees and understory to provide shade, bank stability, and maintain channel function over the long term
5. Promote habitat for riparian dependent species

Possible Prescription Guidelines for treatments adjacent to the Deschutes and Little Deschutes Rivers and for meadows

Within pine dominated units that are not specifically addressed below:

- Units located on outside of meander bends (see Table below) – zone between active channel (edge of floodplain) extending out approximately 75-150 ft., thin pine ≤6” dbh .

Zone beginning approximately 150 ft. from the active channel extending out to approximately 300 ft, thin pine ≤10" dbh or use proposed Rx, whichever leaves more trees/acre.

- Units located on inside of meander bends (see Table below)- Zone between active channel extending out approximately 75-150 ft., thin pine ≤6" dbh. Zone beginning approximately 150 ft. from the active channel extending out to approximately 200 ft, thin pine ≤10" dbh or use proposed prescription, whichever leaves more trees/acre.
- Units located on dynamic segment with potential chute cutoffs and oxbows (see Table below) - Zone between active channel extending out approximately 250-300 ft., thin pine ≤6" dbh.

Table - Unit Locations on River Channels

Treatment Unit	Channel Descriptor
Admin-8	Outside Bend/Inside Bend
FTU-5	Outside Bend
SD-buf2	Outside Bend
SD-buf1	Dynamic (chute cut-offs; oxbows)
FTU2	Dynamic
FTU-4	Straight/Inside Bend/Outside Bend
FTU40	Outside Bend

Unit MR 14, FTU 20, and FTU 48/49/50 within wet meadow/floodplain of the Little Deschutes River:

- From the edge of the floodplain/wet meadow extending out approximately 150 ft, thin pine ≤ 6" dbh. Prescribed fire should not be allowed within the floodplain in order to conserve shrub species.

Within Unit FS 4360:

- From the edge of the floodplain (active channel) extending out approximately 75-100 ft, thin pine ≤ 6" dbh.

Within isolated sedge meadows and Lone Pine Slough:

- Burn or thin young pines encroaching into meadows.
- Burn meadows, including sedges and rush, in the late summer or fall when sedges and rushes are dormant.
- Avoid a hot burn to prevent killing of seeds in the soil and damage to below ground rhizomes.

In addition to the objectives and guidelines above, standards and guidelines from the Upper Deschutes River Comprehensive Management Plan (USDA Forest Service, 1996) will be applied to the proposed units within the Wild and Scenic River Corridor. They will include, but are not limited to the following:

- Vegetation – Upland vegetation will continue to be dominated by ponderosa and lodgepole pine. The forest will be characterized by disturbances which mimic the effects

of periodic occurrence of small, low intensity fires, to perpetuate a mosaic of stand structures and ages and redue the risk of high intensity fires.

- V-6 - Meadow restoration will primarily be achieved using prescribed burning or hand tools to remove encroaching vegetation. Other methods which will achieve objectives may be permitted if they would have no adverse effects on Outstandingly Remarkable Values.
- V-12 - Some fuel reduction activities (pre-treatment) may be permitted (if such activities would not adversely affect Outstandingly Remarkable Values) to assist in the safe use of prescribed fire and adjacent to private inholdings to reduce the threat of fire spreading to federal, state, or county lands and elsewhere.
- V-17 - Vegetation will appear natural and emphasize protection of riparian plant communities. Any silvicultural practices which provide long-term benefits to Outstandingly Remarkable Values may be allowed.

Appendix D – Soils

Existing Environment Soils

The Greater La Pine Community Wildland Urban Interface Hazardous Fuel Reduction Project area is located within the Pumice Plateau Basins Ecoregion which includes the La Pine Basin. The project area functions as a catch-basin for cold air during the winter and has lower minimum temperatures than the slightly higher pumice plateau surrounding it.

This area is a broad basin between the Cascade range and Newberry Volcano with slopes generally less than 5 percent, with a coarse, Mt Mazama, pumiceous ash mantle of varying thickness overlying older alluvial and lacustrine deposits. Soils mapped within the project area are found in the Natural Resource Conservation Service Upper Deschutes River Area Survey, 1992. The primary named series found in the project area listed in order from driest to wettest are: Lapine, Steiger, Shanahan, Sunriver, Tutni, and Cryaquolls.

Dry

Lapine and Steiger soils have a high infiltration rate (low runoff potential) when thoroughly wet. They have a high rate of water transmission and will dry out quickly. Lapine, gravelly substratum phase, is over 60 inches deep to bedrock, is sandy, high in ash, high in gravel size pumice fragments, excessively drained and occurs on plains. Permeability is very rapid. Steiger, loamy substratum phase, is over 60 inches deep to bedrock, is sandy, high in ash, somewhat excessively drained and occurs on plains and hillsides. A loamy buried substratum can occur in both soils from 40 to greater than 60 inches. Permeability is rapid above the substratum in Steiger and moderate with in the substratum.

Shanahan soils have a moderate infiltration rate when thoroughly wet. Shanahan, gravelly substratum phase, is over 60 inches deep to bedrock, is sandy, high in ash, over buried, lake sediments, pumice and localized alluvium, is somewhat excessively drained in the surface and occurs on plains. Permeability is moderately rapid over very rapid in the substratum. The loamy alluvium is 20 to 40 inches deep. Gravel is below 44 inches.

Moderately Wet

Tutni and Sunriver soils have a slow infiltration rate when thoroughly wet. These soils have a high water table which impedes the downward movement of water. Tutni and Sunriver soils are mapped on pumice-mantled stream terraces with air fall pumiceous ash overlying older alluvial and colluvial material. They are both over 60 inches deep to bedrock, somewhat poorly drained and have a water table in most years between 18 and 48 inches below the surface during April through June. Tutni is sandy, high in ash and occurs in swales and depressions while Sunriver is loamy, high ash in the surface and occurs on terraces.

Wet

Cryaqualls are found primarily within the Deschutes River meander belt. They can flood for brief periods October through May and have a water table present somewhere between the soil surface and 60 inches throughout the year. This soil is considered hydric. Cryaqualls have a very slow infiltration rate (high runoff potential) when thoroughly wet. These soils have a high water table, near the surface which impedes the downward movement of water. Cryaquolls are over 60

inches deep to bedrock. They are loamy, very poorly or poorly drained and occur on flood plains and low river terraces. Permeability is rapid. This soil is subject to flooding.

Past Management

The soil resource within the project area has been disturbed to varying degrees by past management. Historic timber sale activity has occurred on 30 percent of the project area from 1976 to 1996. The most recent sale was in 1995/1996, a salvage of beetle killed lodgepole pine under the Pinecrest and Sun Forest Timber sales administered by the Bureau of Land Management. Harvesting from the this salvage utilized mechanical feller bunchers including Temco Excavator boom-mounted shears and Wolverine three wheeled, front mounted shears to cut material and rubber tired skidders to yard approximately 3.7 mbf per acre. These activities occurred during the months of December through June and May through December, respectively for each sale, and there were occasional operational shutdowns during periods of excessive surface moistures during both contracts. These activities incurred detrimental damage to the soil resource in the form of compacted skid trails and landings and variable amounts of compaction between skid trails as a result of field conditions during the shearing operations. Field and aerial photo reconnaissance was used to determine that detrimental compaction comprises 15 to 20 percent of these entry areas with distinct skid trails and landings present in these areas. Displacement of surface organics and mineral soil does not appear to be significant across the area. (from Sussmann 2003)

Limitations

Fertility of these soils is naturally low as nutrient exchange complexes are limiting for sandy soils. Maintaining an intact topsoil layer becomes important for providing aggregate stability and nutrient exchange in these soils. Minimizing disturbance of the surface organic and mineral horizons is important in maintaining productivity of these soils and reducing the wind erosion hazard. All of the soil series present within the project area are susceptible to severe frost damage and frost heave. Heaving is more prominent within the Lapine, Shanahan and Steiger soils due to a less consistent organic mat covering the surface. The Tutni and Sunriver series have a seasonally high water table that limits the rooting depths of trees on site. This feature combined with coarse textured surface and subsurface mineral soil increases the wind throw susceptibility of conifers established on these soils. Cryaquolls are wet (hydric) soils that have a high water table and flooding that favor riparian vegetation.

Management Direction

The 2005 Upper Deschutes RMP and Record of Decision, provides management direction to maintain and restore healthy, diverse and productive native plant communities appropriate to local site conditions. Manage vegetation structure, density, species composition, patch size, pattern, and distribution to reduce the occurrence of uncharacteristically large and severe disturbances. Maintain or mimic natural disturbance regimes so that plant communities are resilient following periodic outbreaks of insects, disease and wildland fire. Identify opportunities to actively repattern vegetation on the landscape to conditions more consistent with landform, climate, biological, and physical components of the ecosystem, and considering social expectations and changes to the landscape driven by human influences.

Soil specific guidance includes:
1. Incorporating measures to protect microbiotic crusts where practicable during vegetative treatments and other authorized activities. Promote conditions favorable for retention and development of biological crusts.
2. Retaining non-commercial vegetative and woody residues from mechanical vegetative treatments scattered on-site wherever possible to:

   a. Maintain soil nutrients and long-term site productivity
   b. Maintain soil organic matter
   c. Provide site protection from wind and water erosion
   d. Facilitate native plant re-colonization by providing micro-site amelioration of extremes of heat and cold

Since there are no specific definitions or limits of detrimental soil conditions in the Upper Deschutes RMP, the following guidance from the Deschutes National Forest LRMP will be used, which includes Standard and Guidelines for management of the soil resource intended to maintain or enhance long-term soil productivity (LRMP 4-70, SL-1). Regional Standards and Guidelines included in FSM 2500, R-6 supplement 2500-98-1 describe conditions determined to be detrimental to soil productivity and outline Soil Quality Standards intended to limit the extent of these conditions to less than 20 percent of an activity area. Detrimental soil conditions are described in the Soil Quality Standards as follows:

1. Detrimental soil compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent or greater over the undisturbed level.
2. Detrimental puddling occurs when the depth of ruts or imprints is six inches or greater.
3. Detrimental displacement is the removal of more than 50 percent of the A horizon from an area greater than 100 square feet and at least 5 feet in width.
4. Detrimental burn damage requires significant color change of the mineral soil surface to an oxidized reddish color, with the next one-half inch below blackened from organic matter charring as a result of heat conducted from the fire.
5. Detrimental erosion requires visual evidence of surface loss over areas greater than 100 square feet, rills or gullies, and/or water quality degradation from sediment or nutrient enrichment.

The R6 Supplement also includes policy direction for designing and implementing management practices which maintain or improve soil and water quality. An emphasis is placed on protection over restoration. Specifically, under 2520.3 – Policy, the narrative reads:

"When initiating new activities:

1. Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area. (This includes the permanent transportation system).
2. In areas where less than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 20 percent.

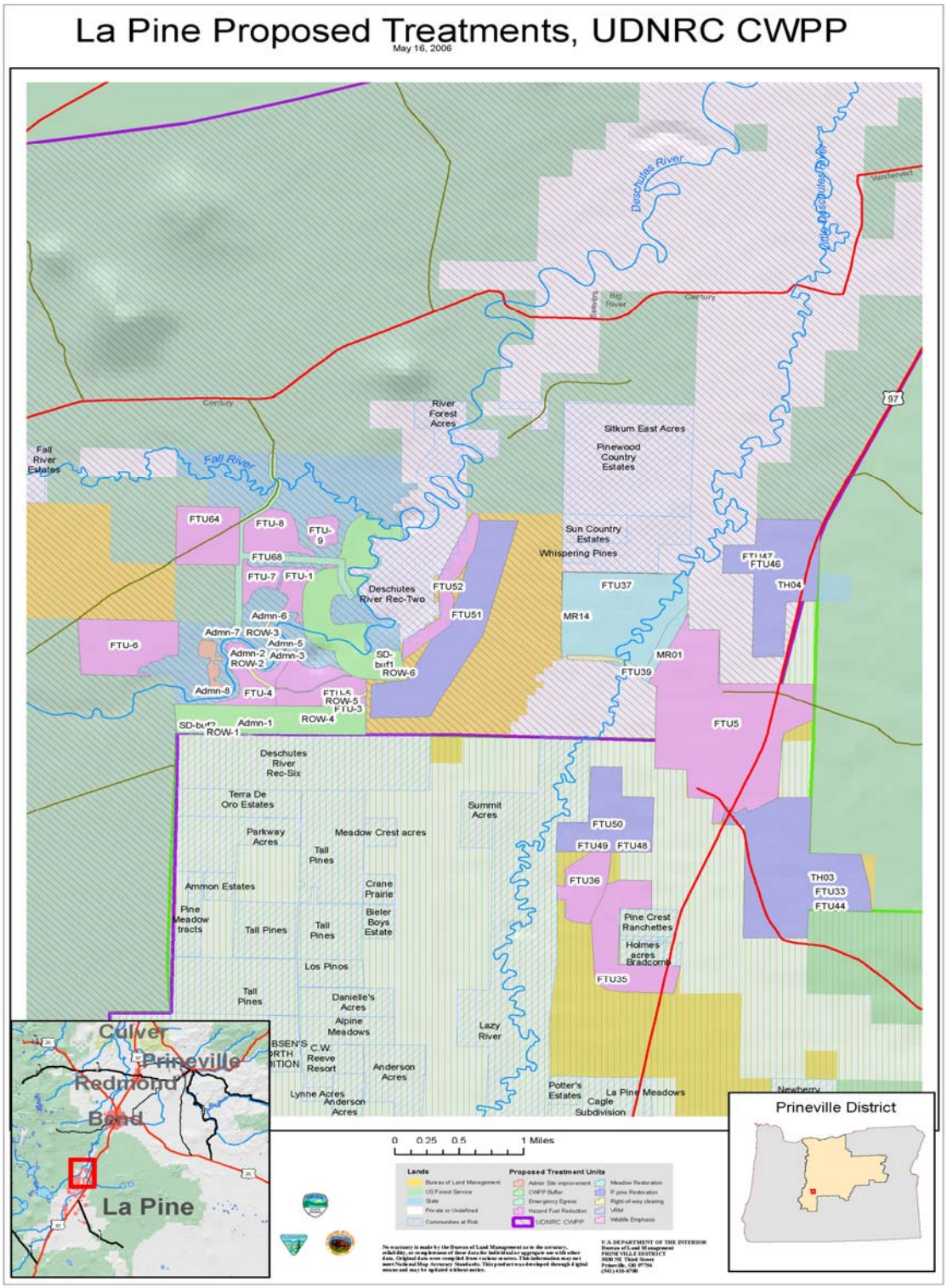
3. In areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality."

Guidelines for Estimating Soil Moisture Conditions

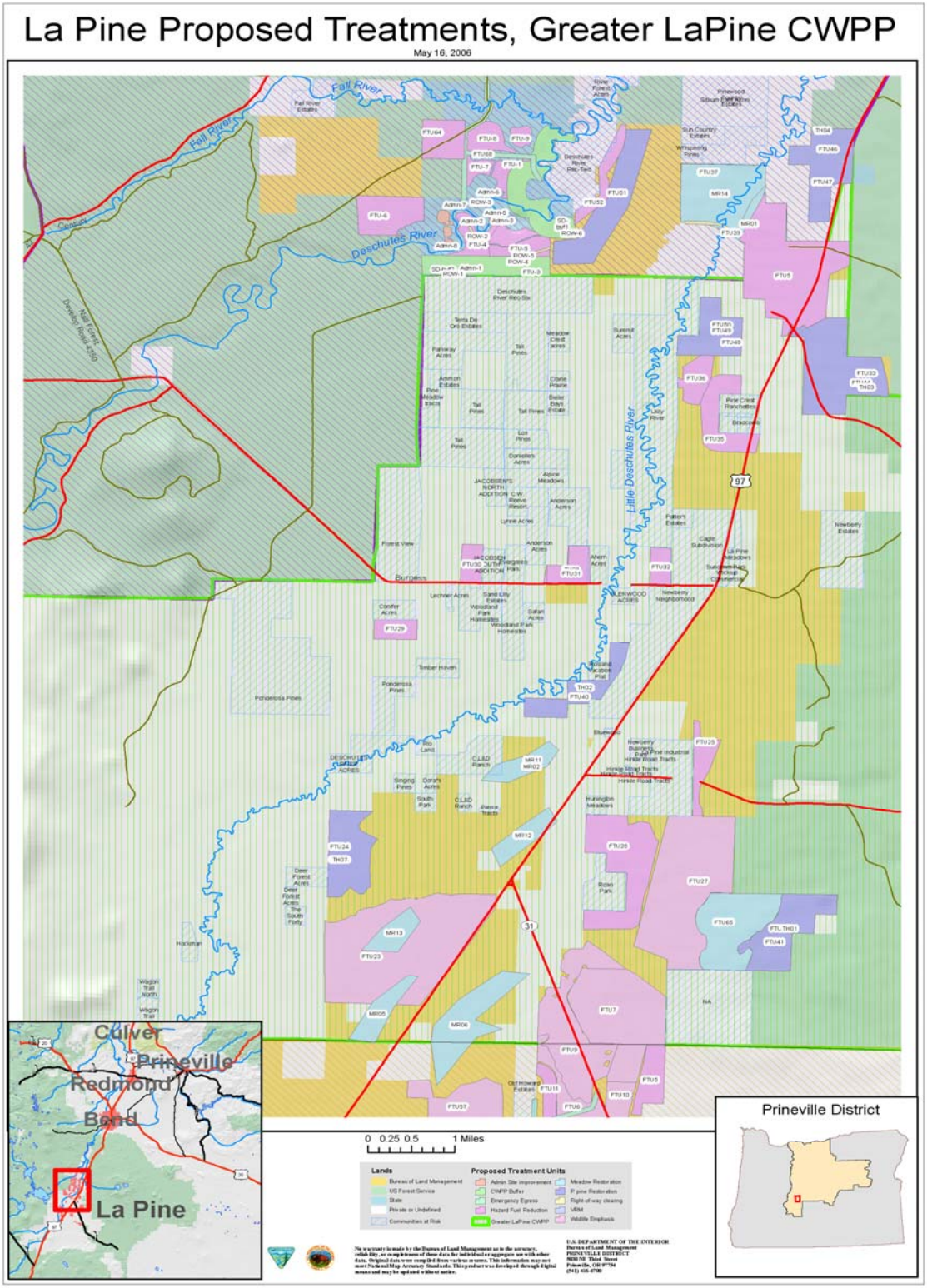
Soil Moisture Deficit (SMD) in inches per foot when the feel and appearance of the soil are as described				
	Coarse Texture	**Moderately Coarse Texture**	**Medium Texture**	**Fine Texture**
	Fine Sand and Loamy Fine Sand	Sandy Loam and Fine Sandy Loam	Sandy Clay Loam, Loam, and Silt Loam	Clay, Clay Loam, or Silty Clay Loam
Available Soil Moisture Percent	Available Water Capacity 0.6 to 1.2 inches per foot	Available Water Capacity 1.3 to 1.7 inches per foot	Available Water Capacity 1.5 to 2.1 inches per foot	Available Water Capacity 1.6 to 2.4 inches per foot
0 to 25	Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure. SMD 1.2 to 0.5	Dry, forms a very weak ball, aggregated soil grains break away easily from ball. SMD 1.7 -1.0	Dry. Soil aggregations break away easily. no moisture staining on fingers, clods crumble with applied pressure. SMD 2.1-1.1	Dry, soil aggregations easily separate, clods are hard to crumble with applied pressure SMD 2.4-1.2
25 to 50	Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remain on fingers. SMD O.9-0.3	Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away. SMD 1.3-0.7	Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away. SMD1.6-0.8	Slightly moist, forms a weak ball, very few soil aggregations break away, no water stains, clods flatten with applied pressure SMD 1.8-0.8
50 to 75	Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon. SMD O.6-0.2	Moist, forms a ball with defined finger marks. very light soil/water staining on fingers. darkened color, will not slick. SMD O.9-0.3	Moist, forms a ball, very light water staining on fingers, darkened color, pliable, forms a weak ribbon between thumb and forefinger. SMD 1.1- 0.4	Moist. forms a smooth ball with defined finger marks, light soil/water staining on fingers, ribbons between thumb and forefinger. SMD l.2-0.4

75 to 100	Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon. SMD O.3-0.0	Wet, forms a ball with wet outline left on hand, light to medium water staining on fingers, makes a weak ribbon between thumb and forefinger. SMD O.4-0.0	Wet, forms a ball with well defined finger marks, light to heavy soil/water coating on fingers, ribbons between , thumb and forefinger. SMD O.5 -0.0	Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily between thumb and forefinger. SMD O.6-0.0
Field Capacity (100 percent)	Wet, forms a weak ball, moderate to heavy soil/water coating on fingers, wet outline of soft ball remains on hand. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking,medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears on soil surface after squeezing or shaking, thick soil/water coating on fingers, slick and sticky. SMD 0.0

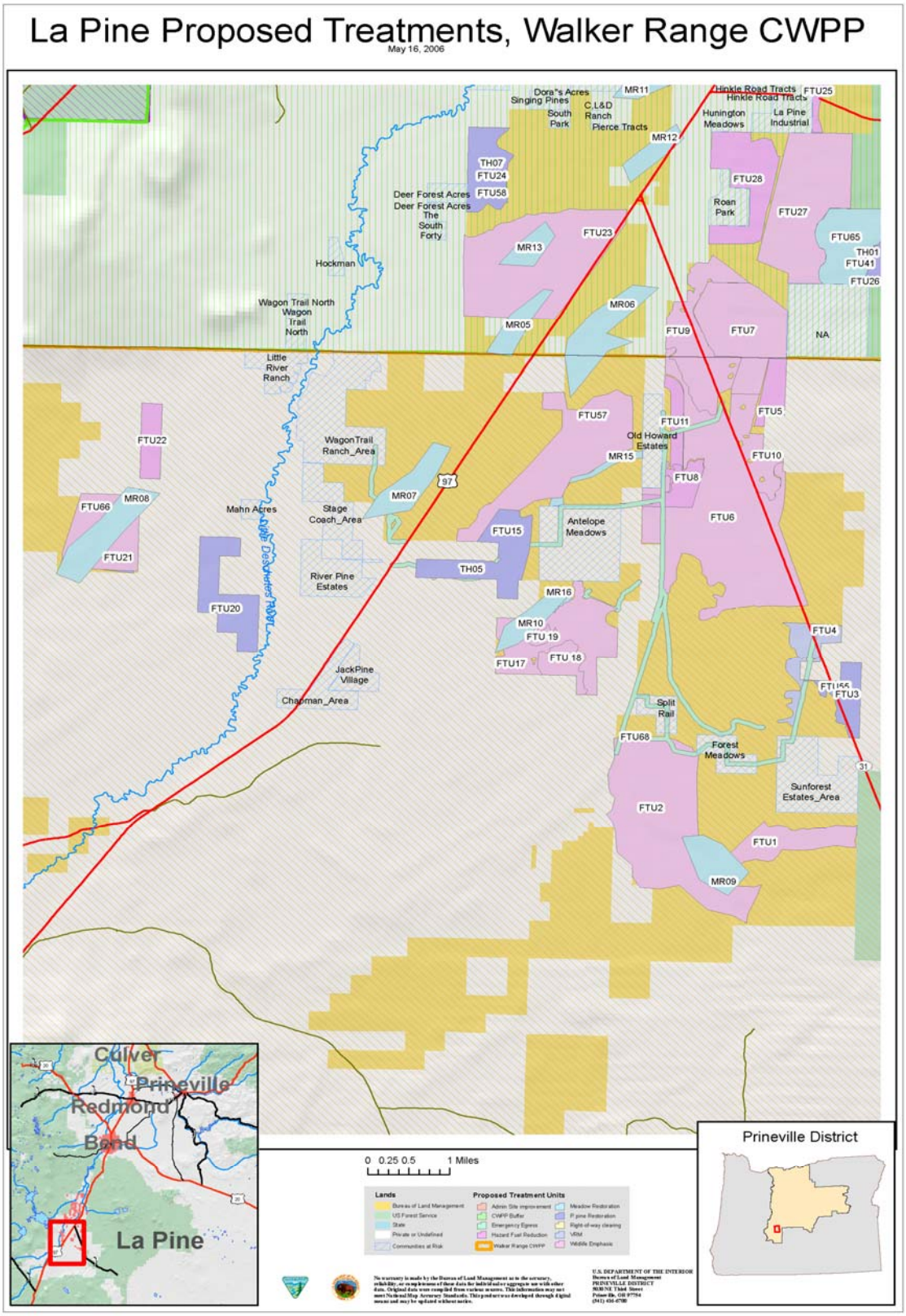
Map 2: Fuels Treatments in the Upper Deschutes River Natural Resource Coalition CWPP Boundary



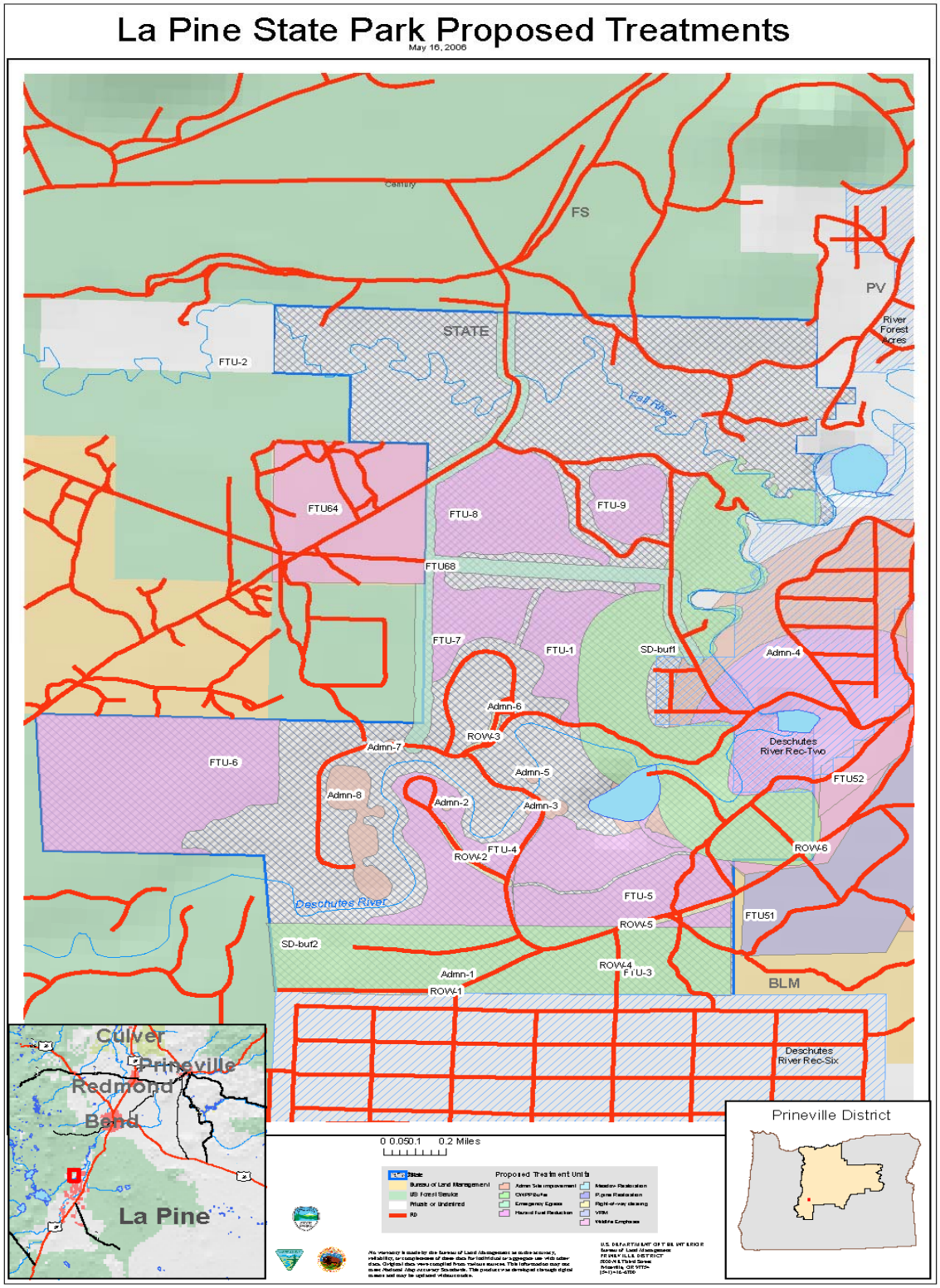
Map 3: Fuels Treatments in the Greater La Pine CWPP Boundary



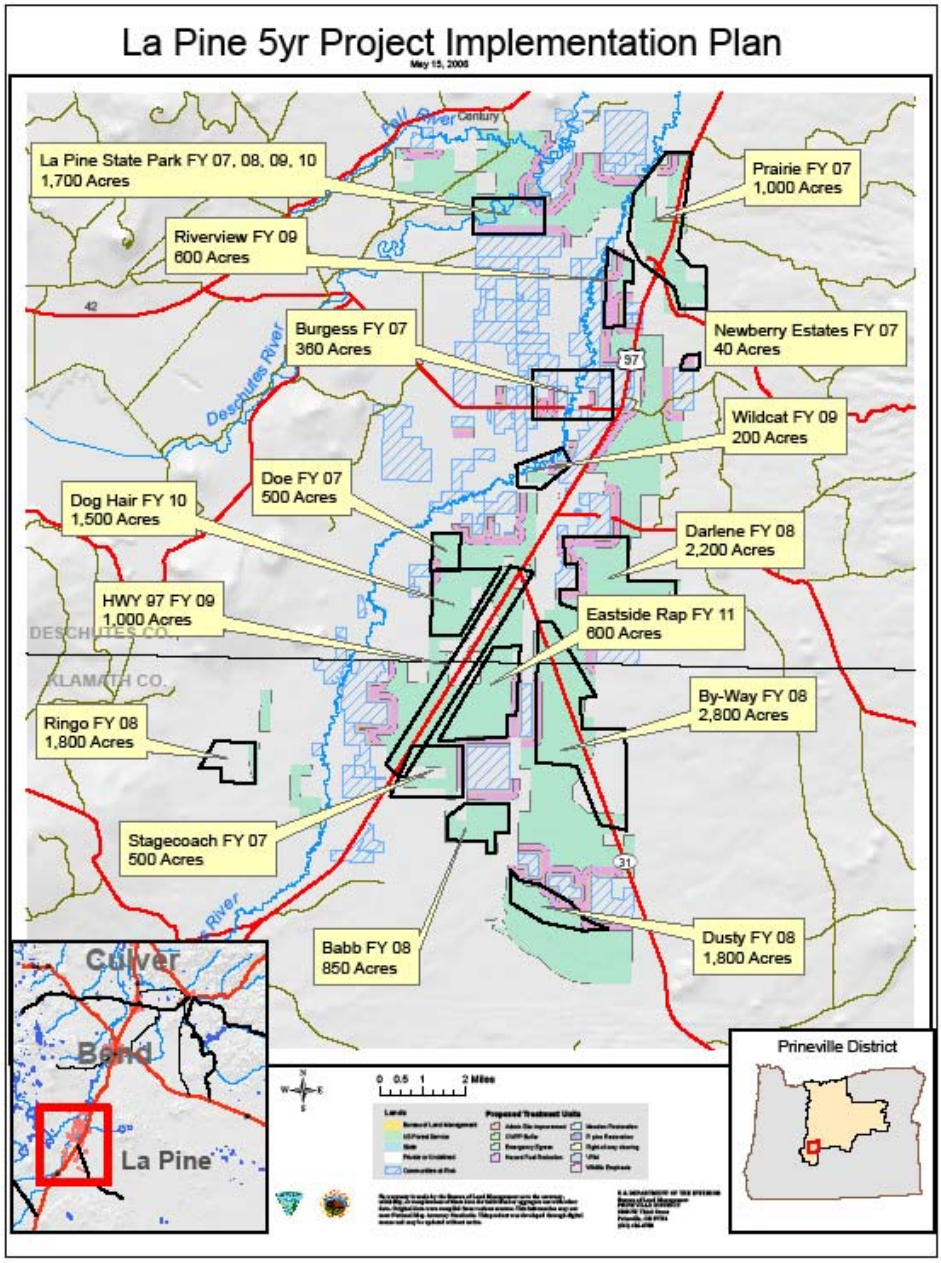
Map 4: Fuels Treatments in the Crescent - Walker Range CWPP Boundary



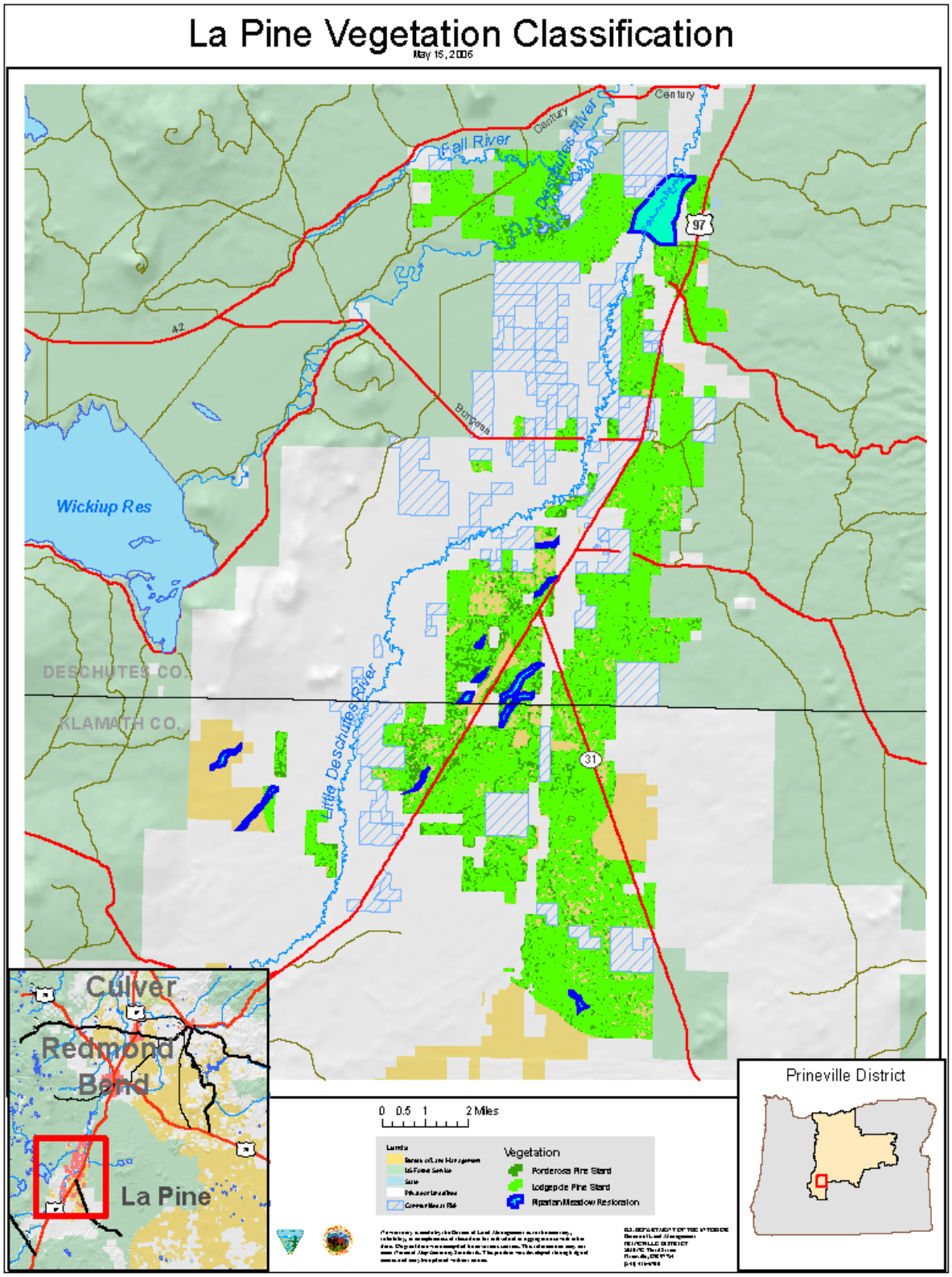
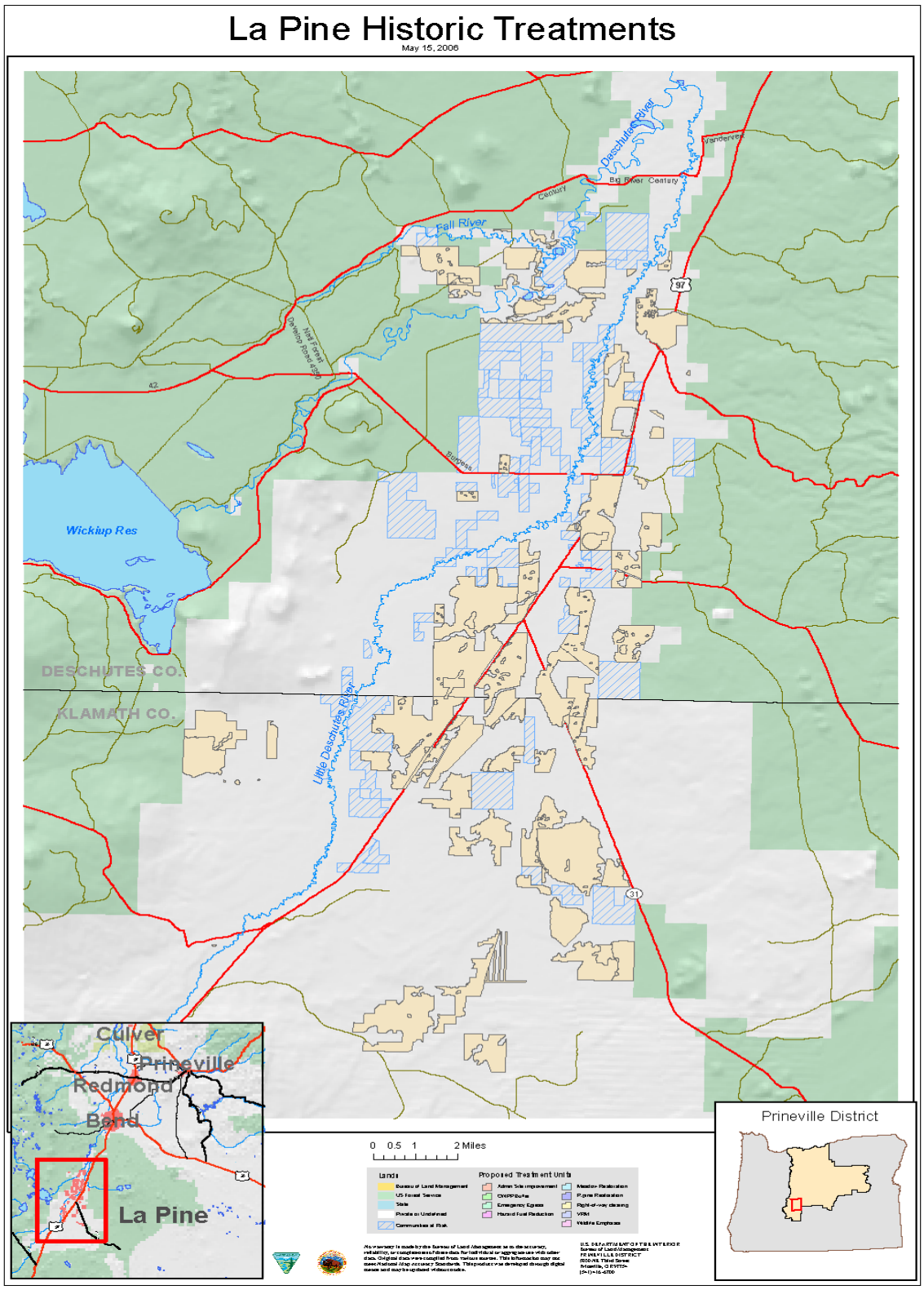
Map 5: Treatments in La Pine State Park



Map 6: Five – Year Implementation Plan for the La Pine Basin



Map 7: Vegetation Classification for the La Pine Basin



Map 8: Historic Treatments