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South Ridgeline/Thurston Hills Wildland Urbai Interface Fuels Reduction Project Eugene District

ENVIRONMENTAL ASSESSMENT

Eugene District Office
3106 Pierce Parkway, Suite E
Springfield, OR 97477-7910
Phone: 541-683-6600

BLM
Eugene District Office

As the Nation’s principal conservation agency, the Department of Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering economic use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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Acronyms

ATV	All-terrain Vehicle
BLM	Bureau of Land Management
BMP	Best Management Practice
CWPP	Community Wildfire Protection Plan
DBH	Diameter at Breast Height (4.5’ from ground)
DEQ	Department of Environmental Quality
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EWEB	Eugene Water and Electric Board
GIS	Geographic Information System
HFI	Healthy Forest Initiative
LRAPA	Lane Regional Air Protection Agency
MBF	Thousand Board-feet
NEPA	National Environmental Policy Act
NHMP	Natural Hazard Mitigation Plan
ODF	Oregon Department of Forestry
ORBIC	Oregon Biodiversity Information Center
OSMP	Oregon Smoke Management Plan
PDF	Project Design feature
PM10	Particulate Matter up to 10 micrometers
PM2.5	Particulate Matter up to 2.5 micrometers
PSI	Pounds per square inch
RMP	Resource Management Plan
ROD	Record of Decision
SSRA	Smoke Sensitive Receptor Area
UGB	Urban Growth Boundary
WFLC	Wildland Fire Leadership Council
WUI	Wildland Urban Interface

1. INTRODUCTION

1.1. Introduction and Background

Historically, the approach to fire management has been one of full or modified suppression for all wildfires; therefore, very limited fuels management has occurred. As a result, there have been numerous and extensive wildfires in the past ten years and greater emphasis has now been placed on wildfire rehabilitation and hazardous fuels reduction. The South Ridgeline/Thurston Hills Wildland Urban Interface Fuels Reduction Project (SRTH WUI Project) is a cooperative venture between the Bureau of Land Management (BLM) Eugene District, the City of Eugene (City), Oregon, and the Willamalane Park and Recreation District (Willamalane) of Springfield, Oregon to reduce wildfire threats and losses to communities and natural resources. The BLM provides community assistance funding and support for prevention, mitigation, education, and outreach regarding wildfire through its fuels management program.

1.2. Project Area Location

Willamalane owns 665 acres in the Thurston Hills area of Springfield, Oregon. This area is located south of Highway 126, and due east of Bob Straub Parkway (see Figure 1). The northern and western boundaries are proximate to residential neighborhoods; to the east is land owned by the BLM, to the south is a mix of undeveloped land and rural single family dwellings. The City owns over 4,600 acres of park and open space lands within and outside the city limits of Eugene. The South Ridgeline portion of the SRTH WUI Project encompasses approximately half of this acreage, reaching from parklands located south of the Willamette River to the forested hillsides within and adjoining the southern City limits (see Figure 2).

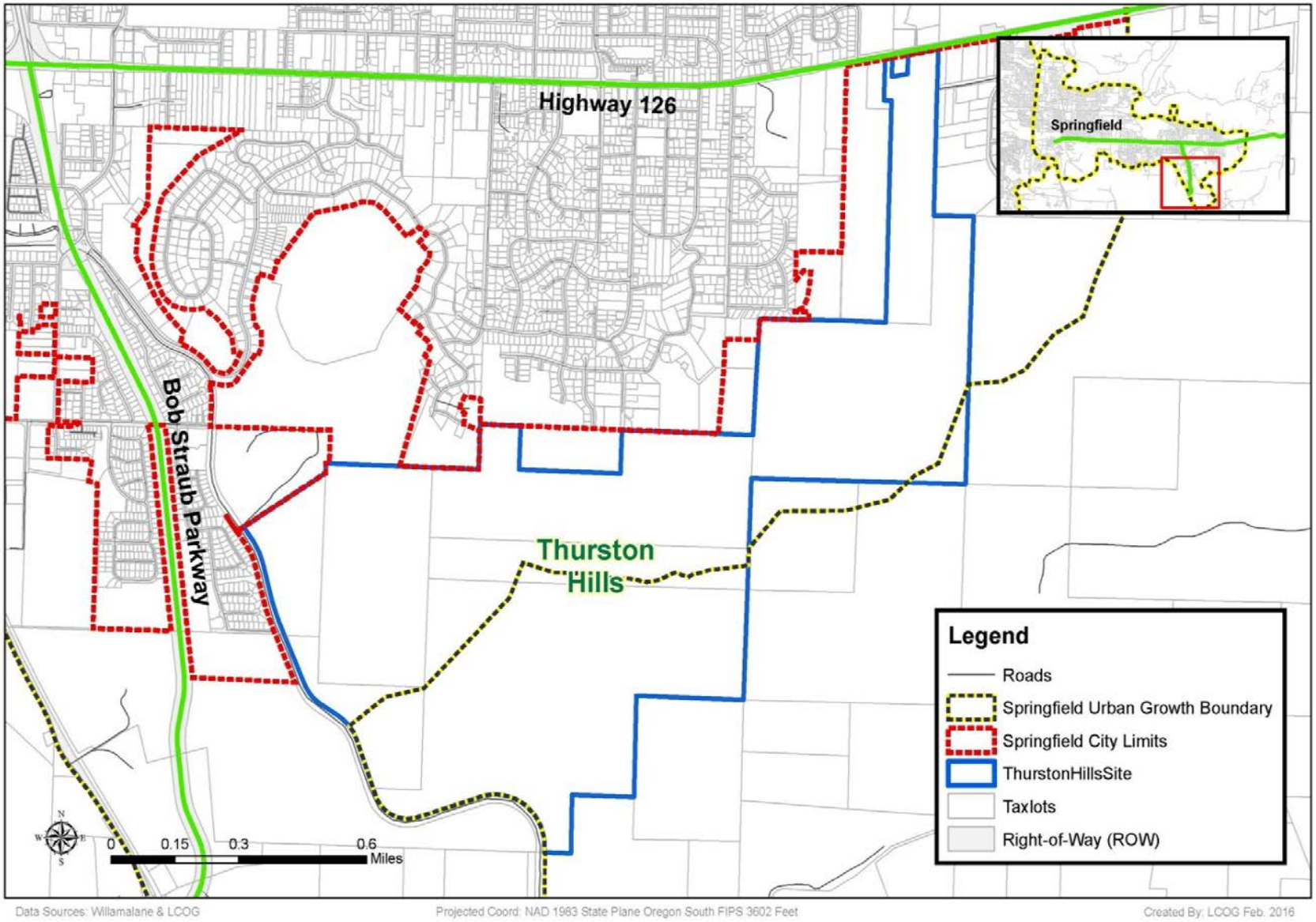
1.3. Purpose of and Need for Action

The purpose of the SRTH WUI Project is to reduce long term risk to people, property, and critical infrastructure from wildfire hazards. Dense shrubs and trees would be removed manually or mechanically to reduce the risk of damaging wildfires at the WUI, and to create and maintain a more fire-resilient landscape.

The need for action has been established by local wildfire and hazard mitigation risk assessments including the Lane County Community Wildfire Protection Plan (CWPP) and the City's 2014 Natural Hazard Mitigation Plan (NHMP). These locally-developed plans evaluated land cover adjacent to neighborhoods and rural residential areas in the WUI and have identified areas that are threatened by the potential for stand-replacing wildfires. These areas contain historically open habitats and forest stands that are often overstocked, have a high fuel load, and contain underbrush that could facilitate crown fires in the event of an ignition.

Representative area of dense shrubs and small trees. Medium-sized oaks at edges and back of photo provide scale.

Figure 1. Thurston Hills Treatment Area



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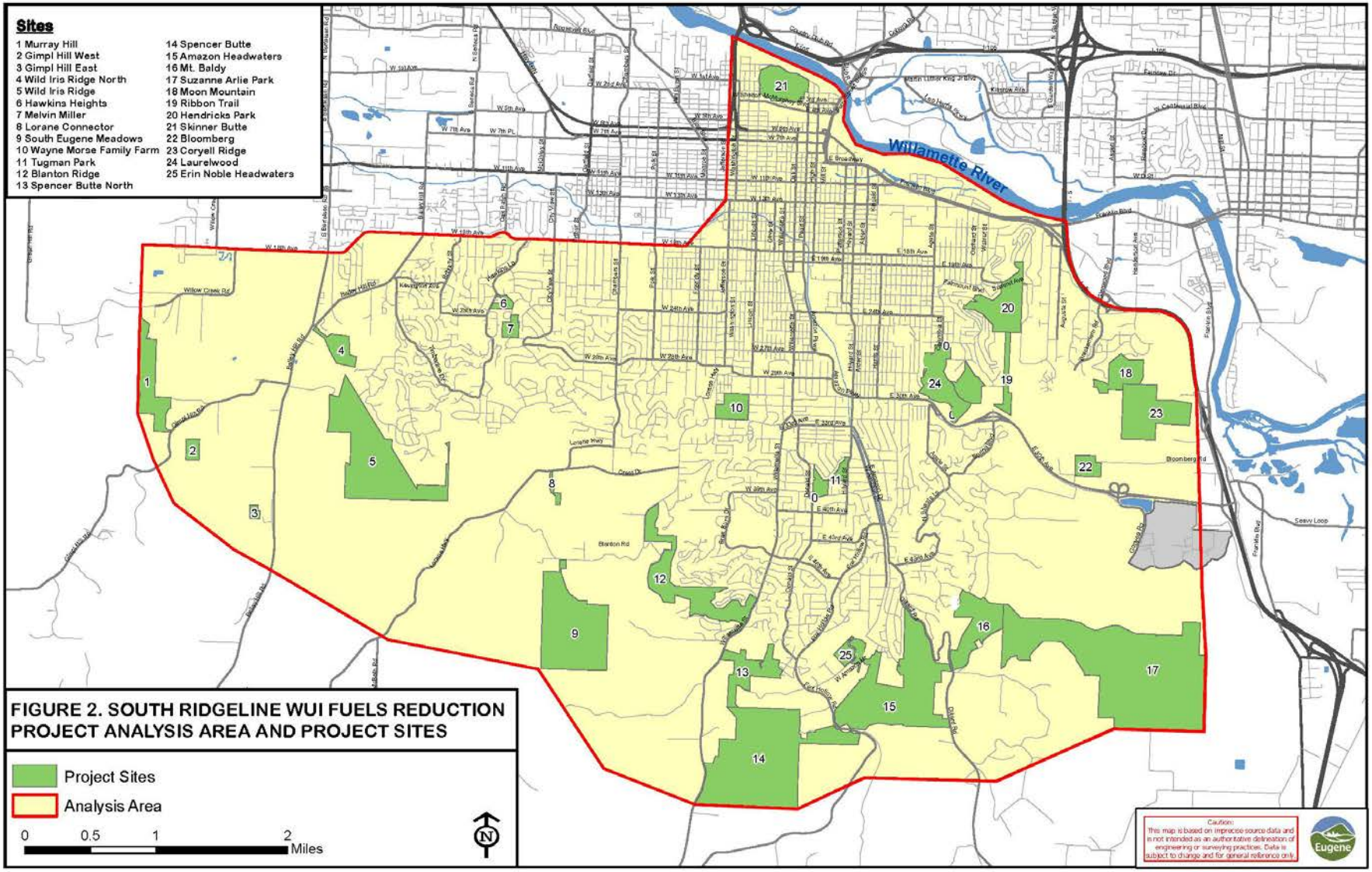

FIGURE 2. SOUTH RIDGELINE WUI FUELS REDUCTION PROJECT ANALYSIS AREA AND PROJECT SITES

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Not only are fuel loads exceedingly high in many of these areas, but recreational trails within the SRTH Project area and abutting private residential land uses increase the potential for human caused ignition. The Lane County CWPP identifies 19.8% of the City at moderate to high risk of wildfire (Eugene Natural Hazard Mitigation Plan 2014), much of it within the South Ridgeline portion of the Project area. Within the BLM Eugene District, over 45,000 acres, or approximately 18% of BLM-administered lands in Lane County are at high risk of wildfire, with 72% of lands at moderate risk (Oregon Natural Hazards Workgroup 2008).

In addition, the project area contains plant communities, such as upland prairies and oak savannas that are dependent on periodic fires to maintain their condition. Successful suppression of wildfires has negatively affected these types of fire-dependent vegetative communities by enabling conifer encroachment, increased tree density, and/or invasion of non-native plant species. These communities are considered scarce within the Willamette Valley area and there is a need to restore these fire-dependent vegetative communities (ODFW 2005, TNC 2004).

This EA analyzes the effects of fuels reduction treatments in the SRTH WUI based upon years of professional experience, review of available literature, and response to stakeholder and public priorities established in the Lane County Oregon CWPP. This EA also addresses other environmental regulations by providing a framework for assessing impacts of proposed future, individual projects. Because this analysis covers a variety of treatments including future maintenance, this EA does not list every discrete, site-specific proposed action that may occur. Instead, the analysis relies on project design features and best management practices to reduce or avoid impacts to different resources. This EA is intended to analyze actions in sufficient detail so that the BLM Eugene District in coordination with the City of Eugene and Willamalane could implement many of the specific restoration actions without additional NEPA analysis.

The SRTH WUI Project, specifically the City and Willamalane lands upon which the fuels reduction treatments would occur, are non-federal administered lands located within the boundary of the BLM Eugene District. The actions, although they would occur on City and Willamalane-owned lands and not BLM administered lands, are consistent with the following management direction and objectives set forth in the Eugene District 1995 Resource Management Plan (RMP) and Record of Decision (ROD). The following objectives and management direction from the 1995 Eugene District RMP specifically support the need for fuels reduction in wildland urban interface areas:

1. Rural Interface Areas[1]:
    a. Eliminate or mitigate public hazards.
2. Wildlife Habitat
    a. Use management practices, including fire, to obtain desired vegetation conditions in special habitats.
    b. Maintain, enhance, and acquire oak, oak-conifer woodlands, and pine stands for associated wildlife species.
3. Fire/Fuels Management
    a. Fuels Management (including Hazard Reduction) Using Prescribed Fire

[1] The 1995 Resource Management Plan defines Rural Interface Areas as BLM land within ¼ mile of private lands zoned for 1-5 acre or 5-20 acre lots located throughout the District (Eugene District Office, 1995). This term is a precursor to the Wildland Urban Interface as defined in the Federal Register as "the urban wildland interface community exists where humans and their development meet or intermix with wildland fuel" (Department of Agriculture and Department of Interior, 2001).

b. Fuels management for Hazard Reduction

1.4. Decision to be Made

The Siuslaw Field Manager and the Upper Willamette Field Manager would use the following criteria in selecting the alternative to be funded for implementation. The Field Manager would select the alternative that best meets these criteria. The selected action would:

- Meet the purpose and need of the project (Section 1.3);
- Be consistent with the Eugene District RMP (Section 1.5); and
- Not have significant impact on the affected elements of the environment.

1.5. Conformance with Land Use Plans, Policies, and Programs

The SRTH Project adheres to national statutes and plans. In 2000, the Secretaries of Agriculture and Interior developed an interagency approach to respond to severe wildfires, reduce their impacts on rural communities, and assure sufficient firefighting capacity in the future. This report, known as the National Fire Plan, outlined a strategy to reduce wildfire threats and restore forest ecosystem health in the interior West. In 2001, Congress funded the National Fire Plan to reduce hazardous forest fuels and restore forests and rangelands. In response, the Secretaries of Agriculture and Interior, along with the Western Governors and other interested parties, developed a 10-year strategy and implementation plan for protecting communities and the environment (Western Governors Association, U.S. Department of Agriculture, and U.S. Department of Interior, 2006). This plan, coupled with the Federal Wildland Fire Management Policy, forms a framework of federal agencies, states, tribes, local governments, and communities to work together to reduce the threat of fire, improve the condition of the land, restore forest and rangeland health, and reduce wildfire risk to communities (U.S. Department of Agriculture and U.S. Department of Interior, 2009). The Healthy Forest Initiative (HFI) was launched in 2002 to reduce barriers to the timely removal of hazardous forest fuels. The HFI expedites administrative procedures for hazardous forest fuel reduction and ecosystem restoration projects on federal land. Sixteen months after HFI was introduced, Congress passed the Healthy Forests Restoration Act of 2003 (HFRA) to reduce delays and remove statutory barriers for projects on federal land that reduce hazardous forest fuels and improve forest health and vigor. The act also helps communities, states, tribes, and landowners restore healthy forest and rangeland conditions on state, tribal, and private lands. In response to requirements of the Federal Land Assistance, Management, and Enhancement Act of 2009, the Wildland Fire Leadership Council (WFLC) directed the development of the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy). The Cohesive Strategy is a collaborative process with active involvement of all levels of government and non-governmental organizations, as well as the public, to seek national, all-lands solutions to wildfire management issues (WFLC 2013). The SRTH Project adheres to the national direction for coordinated wildfire management in the Cohesive Strategy as well as previous initiatives.

The fuels reduction work to be accomplished under this EA is also consistent with several local plans developed with agency and public input. The Lane County CWPP articulates three goals to reduce risk and prevent losses from wildfire:

1. Provide countywide leadership through partnerships to implement wildland-urban interface fire mitigation strategies in Lane County;

2. Improve community strategies for reducing the impacts of wildland-urban interface fires; and
3. Promote wildfire risk reduction activities for private and public lands in Lane County.

The SRTH Project also addresses wildfire and hazard reduction goals set in City and Willamalane plans, summarized below:

1. 2014 Eugene-Springfield Natural Hazards Mitigation Plan:
   - Goal 2: Minimize damage to buildings and infrastructure, especially to critical facilities
   - Goal 4: Decrease disruption of public services, businesses, schools, and families
   - Goal 5: Protect environmental resources and utilize natural systems to reduce natural hazard impacts

2. 2008 Ridgeline Area Open Space Vision and Action Plan:
   - Urban-Rural Transition Goal 2, Strategy A, Support implementation of the Lane CWPP
   - Urban-Rural Transition Goal 2, Strategy B, Assess and manage vegetation to help reduce risk of wildfire
   - Habitat Management and Enhancement Goal 2, Strategy C, Maintenance of Habitat Structure
   - Habitat Management and Enhancement Goal 2, Strategy D, Implement Demonstration Projects

3. Site Management Plans:
   - Wild Iris Ridge Management Plan (2008), Goal 19, Wildfire Prevention
   - Mariposa Woodland Management Plan (2009), Goal 12, Wildfire Prevention
   - Rivers to Ridges Metropolitan Regional Parks and Open Space Study (River to Ridges Plan),
     a. Guiding Principle 2: protect, conserve, and enhance elements of the natural and historic landscape that give the region its uniqueness and sense of place, including forested hillslopes and ridges, river and waterway corridors, agricultural lands, vistas, and unique natural features.
     b. Guiding Principle 5: protect and enhance a variety of habitat types including unique or at-risk plant and wildlife communities. In our region, oak savanna, wetland and upland prairie, and riparian forest are all considered critical habitats.
   - Willamalane Park and Recreation Comprehensive Plan (2010)
   - Thurston Hills Natural Area Management Plan (2016), Section 6.4, Fuels: Restore and maintain the resilience of the natural system and habitats within the Natural Area by managing fuels to fuels to reduce risk, spread, and/or intensity of wildfire to protect values and recreational improvements.

Finally, this EA has been developed in accordance with the 2008 BLM NEPA Handbook H-1790-1.

1.6. Issues

1.6.1 Scoping

The development of the plans described above in Section 1.5, specifically the Lane CWPP, Ridgeline Area Open Space Vision and Action Plan, and the Willamalane Park and Recreation Comprehensive Plan, gathered input from local experts, agency personnel, and the public.

The Lane CWPP process involved staff working collaboratively with fire protection districts and federal and state agencies to develop the plan, as well as outreach to the community. The steering committee used a three-tiered process to engage stakeholders:

1. Landowner Survey - A survey was mailed to 1,500 randomly selected landowners from areas in Lane County in 2002. The survey questions were designed to gain information about landowners' perceptions of wildfire risk and assess their attitudes towards potential actions that communities and homeowners can take to reduce their risk of wildfire.
2. Stakeholder Interviews - Conducted phone interviews in 2004 with key stakeholders to gain information about key issues, concerns, and current activities related to the Lane County CWPP objectives of collaboration, prioritization of fuel reduction projects, and treatment of structural ignitability.
3. Firewise Workshop - Invited stakeholders such as agency staff, planners, developers, realtors, insurers, utility providers, and non-profit organizations to attend a Firewise Communities workshop in 2005. The workshop sought stakeholder participation in identifying obstacles and opportunities to reducing wildfire risk in Lane County.

The 2008 Ridgeline Open Space Vision and Action Plan was developed through a series of four workshops in 2006 and 2007, two of which focused on requesting public input at the beginning of the planning process, and two of which provided a draft of the plan and an opportunity to provide feedback on the planned goals, actions, and strategies. In addition to the public workshops, several presentations were made in 2007 to a wide spectrum of interest groups and organizations to receive input and feedback from those groups.

In the development of the Willamalane Park and Recreation Comprehensive Plan, community involvement was a critical part and a series of community activities were completed, including on-line community surveys (with a Spanish-language version), teen workshops, and outreach at Willamalane's largest community event – Springfield SummerFair. Over 2,000 participants were included in the planning process, including children and youth. In addition, the spring 2010 Recreation Survey included input from 710 residents. The community assessment and input was used to establish goals and strategic actions for acquiring land, improving and managing parks, natural areas, walking and biking trails, recreation facilities, and program opportunities for Willamalane over the next 20 years. Strategies and Actions are based on the Community Needs Assessment results.

1.6.2 Issues Selected for Analysis

Issues identified during internal (BLM and City) and external (public) scoping as described above have been framed as questions and are listed below. These issues serve to focus the analysis and the comparison of alternatives. Issues are analyzed when:

- Analysis is necessary for making a reasoned choice from among the alternatives (e.g., is there a measureable difference between the alternatives with respect to the issue);

- The issue identifies a potentially significant environmental effect; or,
- Public interest or a law/regulation dictate that effects should be displayed.

The following issues were identified through the scoping process and are analyzed in the EA:

Issue 1. How would fuels reduction actions affect wildfire risk in areas immediately adjacent to developed areas or infrastructure?
Issue 2. How would fuels reduction actions affect native plant communities, sensitive plant species, and sensitive fungi?
Issue 3. How would fuels reduction actions affect the spread of noxious weeds and other invasive species?
Issue 4. How would treatment disturbances (noise, presence of humans) and the timing of that disturbance affect migratory bird nesting and migration, as well as other wildlife species?
Issue 5. How would pile burning affect particulate matter concentrations in the airshed?

1.6.3 Issues Considered but Not Analyzed in Detail

Some issues were identified but ultimately were not analyzed in detail due to adequacy of best-management practices and Project Design Features (pdfs) that prevent or substantially limit the intensity and scope of effects. The items below are excluded from detailed comparative analysis as directed by CEQ regulation § 1500.0(b), 1500.2(b) and other sections. The discussion below provides the rationale and justification for not fully analyzing each of these **potential** issues:

- *How would fuels reduction actions affect site-specific soil conditions and productivity?*

The Proposed Action would reduce the hazards associated with a major wildfire by making a wildfire easier to contain and less likely to turn into a crown fire, potentially protecting more of the existing vegetation and reducing the adverse effects of a major wildfire on soils.

The majority of the fuels reduction actions that would occur for the SRTH WUI project would be accomplished with lightweight equipment, generally very small and low psi (5-7 psi) mowers, masticators, mounted on skid steers or similar equipment. Historic haul roads would be prioritized for use in yarding material to landings. Work would be restricted to the dry season (generally July 15-October 1), which would reduce the likelihood of compaction. A limited amount of thinning would occur using ground-based forestry equipment, and would be used only on suitable soils where slopes average less than 35 percent. Yarding methods would not allow dragging of trees or creation of skid trails; any boles over 12 in. dbh would be picked up and placed down, either hauled by a forwarder from the cut location or walked out to a landing by a shovel or similar equipment.

Direct effects of mowing, mastication, and mechanized thinning could be the reduction of herbaceous vegetation, displacement of surface soils and organic matter (top 1-3 inches), and discontinuous localized compaction and erosion within travel corridors and in areas where vegetation is dense. Where organic matter and topsoil are displaced, long-term site productivity may be reduced. Soil erosion rates are not expected to increase because mowing would not completely remove the vegetative cover, and mowing would not occur on steep slopes. Mowing of shrubs and noxious weeds and non-native invasive species would cause minor impacts to soils

where such plants are concentrated. These effects are expected to be small scale, inconsequential and not long-term.

Soil erosion could be a concern for soils exposed due to removal of dense trees and shrubs in areas that would need to be revegetated. Ground-based, low pressure tracked skid steers would be used over much of the project area; where soils are already bare under thickets of invasive shrubs and trees the treatments would temporarily result in bare soil. Treatment actions would be followed with seeding to stabilize soils and minimize erosion during the winter following treatment. The potential for erosion on bare soils depends on the steepness of slope, soil type, and the amount and type of surrounding vegetation. Individual treatment sites would be evaluated for erosion potential and may have treatment slash placed on them to mitigate impacts.

Pile burning may cause productivity loss due to the consumption of the duff layer, and would occur in very localized areas. Yarding and grinding the cut woody material is proposed wherever feasible, reducing the number of burn piles resulting from treatments under this project than would occur without grinding. Over the long-term, prescribed fire maintenance treatments would reduce the need for mechanical treatment and also would reduce the severity of fire-associated soil loss because vegetation dominated by herbaceous species has lower intensity. Therefore, maintaining the natural fire regime would result in a moderate improvement in long-term soil productivity and fertility.

With the implementation of PDFs outlined in Section 2.3, impacts to soil productivity as a result of the proposed action are not anticipated to be of real consequence and this issue was not analyzed in detail.

- *How would fuels reduction actions affect sedimentation, temperature, or flow in streams?*

The analysis area contains three fish-bearing perennial streams, however no fuels reduction treatments are proposed within or near these streams. Two of them, Willow Creek and Spencer Creek, are not located on or near City property. The third, Amazon Creek, is located in an urban setting, where vegetation on either side consists either of grassy mowed areas or a narrow strip of riparian shrubs that adjoin grassy mowed areas. Thus, the vegetation along Amazon Creek is not in need of fuels reduction treatments and no fuels reduction treatments are proposed for the perennial portion of the creek. There are two perennial streams that cross the edges of the Thurston Hills portion of the Project area. Each stream has only a short segment located within the project boundary. No fuels reduction treatments are planned for the perennial portions areas of these streams.

Project sites within the analysis area are primarily located at the highest local elevations. Headwater streams take shape in shallow rivulets high up on the landscape, forming more well-defined channels as they move downslope. These uppermost headwaters range from prairie seeps which are shallow depressions in the topography where water collects seasonally but may or may not form surface flow; to first-order headwaters, comprising very small channels that convey seasonal surface flows; to forested headwater channels which are intermittent and shallow to locally incised, but which are bordered by mature tree canopy on either side. In Amazon Headwaters park in particular, some of these headwater streams do flow for several months in wet years. In general however, due to their intermittence, low volume, and narrow channel morphology, most of the headwaters in the analysis area are not characterized by expansive riparian forests; rather they are encompassed within the predominant terrestrial grassland or

forest cover. In places, riparian tree species such as Oregon ash, black cottonwood, big-leaf maple and red alder are found growing in narrow bands alongside headwater drainages.

PDFs would limit any potential for sedimentation or surface runoff along intermittent headwaters, no road construction is associated with the proposed action, and proposed activities would take place during the dry season which would further reduce potential sedimentation. There are no BLM sensitive species associated with the intermittent headwaters and perennial streams in the project area. For these reasons, this issue was not analyzed in detail.

- *How would the proposed treatments affect or influence climate change and or carbon storage*?

Two primary ways that the proposed action may affect climate change are the greenhouse gas emissions associated with operating machinery to remove shrubs and trees and the change in future carbon storage from tree removal.

The footprint of the proposed action is relatively small. A maximum of approximately 1,700 acres would receive treatment over the lifetime of the project, with approximately 200 acres receiving treatment in a given year. Most of the acres treated would involve mowing and masticating of dense shrubs. Up to 780 acres would include thinning of trees from existing stands, none of which are greater than 20 inches dbh.

Fuels reduction projects mow and thin to reduce the risk of crown fire, which are difficult to control. Fuels reduction actions temporarily lower the carbon stored in forest biomass and dead wood because the thinned trees are typically piled and burned or mulched and then decompose. Furthermore, by reducing the likelihood of a crown fire, maintenance treatments such as prescribed burning support the long-term survival of the remaining trees in the stand. Stand thinning increases the growth of the remaining trees not removed under the thinning prescription, but does reduce the total wood volume in a site until the remaining trees grow sufficiently. When harvested trees are used as biomass to produce energy, associated carbon benefits may compensate for the lower carbon storage of the stand. However, even complete use of the harvested trees for biomass energy may not produce a total carbon benefit greater than that of an unthinned stand (Ryan et al. 2010).

Because the proposed action is very small-scale in nature and would result in only a small amount of carbon dioxide emissions for a brief period of time and because most of the vegetation to be removed is shrubs and small trees, there is no potential for a significant impact related to greenhouse gas emissions or carbon storage and this issue does not require more detailed analysis.

- *How would the alternatives affect historic and prehistoric cultural sites?*

No known historic or prehistoric sites are located within the project sites in areas where treatment may occur. During project implementation, if the BLM, City, or equipment operators encounter or become aware of any objects or sites of cultural value, such as historical or prehistorical ruins, graves, grave markers, fossils, or artifacts, all operations would be immediately suspended in the vicinity of the cultural site. The BLM would be notified and a BLM archaeologist would evaluate the site before work could resume in that area. PDFs are outlined in Chapter 2. Therefore, there is no potential for a significant impact related cultural resources and this issue does not require additional analysis.

- *How would fuels reduction actions contribute to meeting the recovery targets described in the recovery plan for ESA listed species?*

In many areas where fuels reduction treatments would occur, the proposed action would improve required habitat structure for ESA listed species. The analysis area is located within the area covered by the Prairie Species of Western Oregon and Southwestern Washington (USFWS 2010). Species addressed by the recovery plan include 11 herbaceous plant species and two butterfly species which depend on open habitats dominated by herbaceous vegetation for survival.

Today, much of the original grassland and oak ecosystems historically abundant in the Willamette Valley have been lost; converted to agricultural, urban and rural development, and timber land uses. Of nearly 2 million acres, less than 2% of historic upland prairie and oak savanna and less than 7% of oak woodland persist (ODFW 2005). Furthermore, remaining grasslands are threatened by ecosystem degradation from invasive species and by successional changes to woodland and forest as a result of fire suppression (ODFW 2005, USFWS 2010). A wide variety of plant and animal species including several endemic to the Willamette basin are dependent upon these very prairie and oak systems (Christy and Alverson 2011, Floberg et al. 2004, Alverson 2005, Vesely and Rosenberg 2010), and many populations are declining. Habitat loss and fragmentation have been identified as the major limiting factors affecting most of the listed and at-risk terrestrial wildlife species in the Willamette Valley (USFWS 2010, Vesely and Rosenberg 2010, Primozich and Bastasch 2004).

There is only one known occurrence of a federally-listed species on the project sites within the analysis area. One patch of Kincaid's lupine (*Lupinus oreganus*) is located within a BPA powerline transmission corridor at one of the sites. No fuels reduction work is proposed in this location. Because the proposed action would not have an impact on ESA listed species, and would in fact benefit these species by restoring more open habitat they require, this issue was not carried forward further in the analysis.

- *How would the proposed treatments affect fish habitat, including water quality, aquatic and riparian vegetation, and habitat complexity?*

The proposed action does not include any treatments in aquatic or riparian areas, and therefore would not affect aquatic or riparian vegetation or habitat complexity. There are no perennial streams on the proposed project treatment sites, and no listed fish species on the project sites. Aquatic habitat is limited in the analysis area and especially limited on the proposed project treatment sites. Sedimentation would be limited by PDFs, and therefore would not have an effect water quality. This issue was not carried forward further in the analysis.

- *How would fuels reduction actions contribute to the production of quality forest products?*

Thinning could improve tree health, vigor, and productivity. However, proposed potential thinning is on such a small scale that viable economic returns from the activities are not realistic. Additionally, neither Willamalane or the City is managing any of the potential thinning areas for forest productivity, and many of the mature trees to be retained are oaks, for which only a very limited market exists. Therefore, this issue was not carried forward in the analysis.

- *How would the creation and use of skid trails/corridors in upland areas affect water quality?*

The proposed actions are not in close proximity to any perennial streams, and PDFs would limit treatments on either side of intermittent channels. Mastication, mowing, and thinning actions would be conducted outside of the wet season, minimizing erosion. Lightweight equipment would be used to minimize soil compaction and limit the creation of new drainage areas. Where appropriate, for example thinning on gentle to moderate slopes, equipment travel corridors would have slash placed on them. Areas where ground cover vegetation is bare or becomes denuded due to equipment travel would be reseeded.

2. PROPOSED ACTION AND ALTERNATIVES

This chapter is a description and analysis of two alternatives, the No Action alternative and the Action Alternative. To consider an action alternative, it must meet the purpose and need while not violating any minimum environmental standards. The alternatives developed are consistent with the Eugene District RMP and satisfy the purpose and need as described in Chapter 1.

2.1. Alternative 1: No Action

In accordance with BLM NEPA guidelines H-1790-1, Chapter V (BLM 2008), this EA evaluates the No Action Alternative. The No Action Alternative provides a baseline for the comparison of alternatives, and is a description of the existing condition and the continuing trends in the project area. Selection of this alternative would not preclude future treatments within the project area that a subsequent EA could analyze.

Under the No Action Alternative, the SRTH WUI Project area would not receive BLM funding for the treatments described in this EA in the near future. Ongoing activities would continue to occur. These include localized weed control and mowing of firebreaks in some locations. Fire suppression activities would continue by the Eugene-Springfield Fire Department and the Oregon Department of Forestry (ODF). This alternative does not meet the Purpose and Need.

2.2. Alternative 2: Proposed Action Fuels Reduction in the SRTH WUI Project Area

The proposed action, Alternative 2, is providing BLM funding for hazardous fuels reduction treatments and periodic maintenance of those efforts on 1,700 acres owned by the City and Willamalane in Eugene/Springfield's WUI. The objectives for treatment prescriptions are to decrease fuel continuity to reduce risk of large-scale fire event, reduce surface fuel loads, increase height to the base of live crowns, and facilitate on-going maintenance of treatment areas.

The types of treatment activities used to accomplish the project objectives would include:

- Thinning of small (<12 in. DBH) and medium (12-20 in. DBH) trees and shrubs
- Mowing and mastication of grass, weeds, brush, and other woody fuels
- Piling and burning of weeds, brush, and other woody fuels
- Chipping or grinding of small trees, brush, and other woody fuels
- Seeding and planting of propagules (native species)
- Propane flaming of non-native plants
- Prescribed burning to manage thatch and woody vegetation regrowth

Fuels reduction activities would be accomplished by both manual and mechanical methods. Mechanical treatment methods would be conducted in conformance with the Eugene District RMP for T&E and Bureau-sensitive species and habitat.

The City/Willalamane has identified approximately 1,700 acres in need of fuels reduction treatments on City/Willamalane parklands. Additional acres that could receive treatment are present within the SRTH WUI Project area, located on private lands. The City acquires new parklands on occasion and it is the intent of this EA to include these acres within this analysis, and thus, make them eligible for future fuels reduction activities if they come into City ownership. These potential future parklands are on parcels that have been reviewed and visited

by the City. They are similar to the existing City lands analyzed in this EA in terms of ecosystem types, vegetation composition, and recent land use history.

It is not the intent of the SRTH WUI Project to treat every acre. Areas would be treated based on available funding, which may vary annually. Areas selected to receive fuels reduction treatments include historic grasslands (prairies and savannas) invaded by shrubs and trees at >5% total cover; historic oak woodlands affected by densely regenerating oak or invading conifers raising canopy cover to >50%, or by invasion of ladder fuels (shrubs >10% cover) reaching into the lower branches of the trees; and conifer forests where crowns are touching, mortality is occurring in suppressed trees, or conditions would result in flame lengths greater than 4 feet in height during a fire.

Areas demonstrating any or all of these conditions would be thinned to reduce tree density and lessen wildfire risk. Existing roads and landing areas may require maintenance prior to project implementation. Thinning would be limited to stems less than 20 inches in diameter at breast height (dbh) and less than 80 years old.

2.3. Project Design Features and Best Management Practices

Project Design Features (PDFs) are an integral part of the Proposed Action and have been developed to avoid or reduce the potential for adverse impacts to resources. The following PDFs would be used for actions in the SRTH WUI project.

2.3.1 Thinning of small (<12 in. DBH) and medium (12-20 in. DBH) trees and shrubs

- Reduce stand basal area up to historic (if known) or the older cohort stand density, removing young conifers and retaining some younger oaks for recruitment. Retain single-stemmed oaks in all age/size categories.
- In areas where conifers are natural associates within oak woodlands, leave a wide spacing (< 10 trees/acre) of recruitment age conifers with special consideration for retaining ponderosa pine.
- No trees greater than 20 in. DBH, or older than 80 years, would be treated. All native trees established prior to Euro-American settlement, as evaluated by a trained ecologist, would be retained.
- Utilize, when operationally feasible, falling and yarding techniques to protect snags, down logs, and large retention trees. When feasible, skid trails shall be placed on the landscape to avoid felling or damaging large retention trees, snags, and down logs. Down logs that present a hazard to logging operations or that are needed to close roads may be relocated within the project area.
- Reduce shrub encroachment to decrease fuel continuity. Remove all invasive, non-native shrub species. Retain native shrubs at low to moderate density, as appropriate and feasible, to provide wildlife habitat.
- Woody material not piled, masticated, or chipped would be cut and scattered to reduce fire hazard.
- Fuel hazard reduction units could be thinned by hand or with fire 3 to 10 years following the

initial treatments. Stands may be treated as often as necessary to maintain the reduced wildfire risk condition.

- Maintenance thinning would include cutting hardwood and shrub species sprouts and invasive, non-native species.
- No treatment of native species would occur within 60 feet of springs or ponds, or within 35 feet on either side of long-duration intermittent streams.
- Stream and riparian restrictions include: 75 feet no thinning buffers on all intermittent streams, avoiding placement of landings in riparian areas; not operating ground-based equipment in stream channels except for a minimal number of temporary stream crossings; not allowing slash to accumulate in stream channels; preventing changes to stream channels as a result of ground based yarding; and protection of small streams and wetlands.
- Exclude mechanical equipment from slopes 35 percent or greater.
- Retain all snags unless they need to be felled for worker safety.
- Buffer special status wildlife species sites according to the management recommendations for that species in effect at the time of treatment. Buffer size and strategy would depend on site-specific conditions, proposed treatments, and species involved. Fuels treatment could take place within those buffers if the species or specific habitat characteristics would not be adversely impacted.
- Buffer special status plant sites according to the management recommendations for that species in effect at the time of treatment. Buffer sizes would be determined based on species, proposed treatments, and site-specific environmental conditions.
- Apply seasonal restrictions (generally March 1 to June 30 or until two weeks after the fledgling period) or suspension of any harvest and associated activities that would occur within 1/4 mile (or more) of known nesting great blue herons, peregrine falcons, bald eagles, spotted owls, great grey owls, accipiter hawks, and within 200 feet of other owl, hawk, or raptor nests if they are located at any time during project activities.
- Limit use of native surfaced roads to the dry season (generally between July 1 and October 1). Waterbars, drain dips, and/or lead-off ditches may be required to create an erosion resistant condition on roads during seasonal closures. Access to such roads shall be blocked during closures.
- Refuel and maintain equipment (e.g., chainsaws, ATVs, mowers) a minimum of 100 feet from waterbodies and wetlands. Keep a Spill Contamination Kit on-site during any operation within the project area; prior to starting work each day, all machinery would be checked for leaks and necessary repairs would be made.
- All equipment must be washed prior to arrival in the project area to remove mud, debris, and weed seeds.
- To minimize impacts to residual trees and soils, cable yarding shall not be allowed. One-end suspension of small-diameter trees and shrubs is required. Medium-diameter trees (12-20 in. DBH) must be completely suspended during yarding.
- Mechanized harvesting systems are approved when:

- Movement of cutting equipment off designated skid trails shall be limited to a single pass, when feasible mechanized harvester shall travel on the cushion of slash created by the harvesting process.
- Where slopes are less than 35%.
- When soil moistures are low (≈25%) and provide resistance to compaction (typically July 1 -October 1), unless waived by the Authorized Officer.

- The following requirements would apply to areas treated using ground-based equipment:
  - Use existing travel routes where possible to access treatment areas historic or existing skid trails where possible.
  - Restrict the use of ground-based equipment to seasonally dry period when soil moisture content provides the most resistance to compaction. This is usually July 1 to October 1.
  - Minimize damage to residual tree roots.
  - To the extent practicable and needed, logging debris and brush residue would be placed to prevent soil compaction and reduce erosion.

2.3.2 Mowing and Mastication of slash, weeds, brush, and other woody fuels

- Mow or masticate weeds, brush, small diameter trees (<12 in. DBH) and other woody fuels on gentle to moderate slopes of less than 35%.
- All project design features described in section 2.3.1 above relating to soil protection, work near streams and wetlands, wildlife, weeds, and environmental protection (refueling, spills, etc.) also apply to mowing and mastication.
- Mowed and masticated slash would be scattered and used as mulch.
- For any mowing or mastication that occurs prior to July 15, check all areas of dense vegetation for use by nesting songbirds prior to any treatment.
- Apply seasonal restrictions (generally July 15 to November 1). For any mowing or mastication that occurs prior to July 15, check treatment areas with dense vegetation for use by nesting birds prior to any treatment. Avoid destruction of nests.

2.3.3 Piling and burning of slash, non-native plants, brush, and other woody fuels

- No slash piles to be burned would be constructed on sites located within the City of Eugene boundary.
- Slashed material that measures 1 to 12 inches in diameter and more than 2 feet long could be hand piled or machine piled.
- Pile size would normally be 6 feet by 6 feet an average of 50 piles per acre, if piled by hand. If machine piled, piles would be on average 10 feet by 10 feet.
- Cover piles to permit burning during the rainy season and to ensure lower fuel moisture to facilitate quick and complete combustion while reducing smoke emissions. Pile covering would be in compliance with the Oregon Smoke Management Plan. If covers would not be removed prior to burning, piles shall be covered with 4 mil black polyethylene sheeting no more than 100 square feet in size [Oregon Administrative Rule 629-048-0210(4)].

- Slash pile burning would generally occur within 1 to 1.5 years after cutting, or when fuels have cured to allow for a hotter, cleaner burn, to minimize smoke.
- Slash piles would generally be burned between October 15 and May 1 after significant precipitation has occurred to limit the fire from creeping between piles and to minimize the potential of fire escape and damage to residual stands. Burning piles during the rainy season when there is a stronger possibility of atmospheric mixing allows for better smoke dispersion. All burning would be completed only after proper clearances have been provided by the ODF.
- No pile burning would occur within 60 feet, each side, of fish-bearing or perennial streams, springs, ponds, or vernal pools, or within 35 feet on either side of long-duration intermittent streams.
- Piles would be dispersed across treatment areas where feasible.
- Piles would not be located within the driplines of large-diameter oak trees.
- Leave 2 to 4 piles per acre unburned to provide wildlife habitat.

2.3.4 Chipping or grinding of small trees, brush, and other woody fuels

- To reduce the amount of surface fuel loadings and emissions from prescribed burning, when feasible, slash and small-diameter trees would be removed from the site by using whole tree yarding.
- Material to be chipped would be staged in landings adjacent to gravel roads. Material would be chipped and hauled off-site in fall or winter.
- At the landings, slash would be piled, chipped, and removed for biomass.

2.3.5 Seeding and planting of propagules (native species)

- All seeded or planted materials would be native to the Willamette Valley.
- Most areas of disturbance (including all burned areas) would be planted with native species, where necessary, to establish these species or to discourage establishment, repopulation, or spread of invasive species.

2.3.6 Propane flaming of non-native plants

- A propane flamer would be used outside of the fire season and during times of low fire risk. Timing would be in the wet season, generally between November 1 and May 1, after sufficient rainfall has occurred and surrounding vegetation is green and wet, to prevent ignition of non-target species.
- A propane flamer would be used on herbaceous non-native, invasive plants.

2.3.7 Prescribed burning to manage thatch and woody vegetation regrowth

- Develop an approved prescribed fire plan for all prescribed burn units prior to ignition and in compliance with the *Interagency Prescribed Fire Planning and Implementation Procedures Guide* (PMS 484). The prescribed burn plan would contain measurable objectives, a predetermined prescription, and contingency plan to be implemented in the event of an escaped burn.
- Monitor burning conditions closely to prevent fire escape and to minimize damage to residual trees and vegetation.
- Implement prescribed burns in accordance with the Oregon Smoke Management Plan to reduce emissions and avoid smoke intrusions into designated areas.
- Complete fire mop-up as soon as practical to reduce potential level of smoke emissions.
- Construct all firelines in woodlands by hand. Construct water bars on firelines according to District spacing guidelines.
- Rehabilitate all firelines constructed for this project that intersect existing roads or trails to the extent that unauthorized off-highway vehicle use is discouraged. This could include dragging cut vegetation over the lines, seeding, or mulching to hide the firelines at points where they intersect roads or existing trails.
- Do not introduce wetting agents (i.e., foam) into springs, riparian areas, or stream courses.
- Ignite prescribed burns outside riparian buffers. Allow low intensity prescribed burns to back into riparian buffer areas.
- Implement prescribed burning when soil and duff moisture and weather conditions allow for low intensity burning in order to minimize tree stress and adverse effects on tree roots and foliage.
- Burning may occur through some vascular plant sites during plant dormancy, with approval from the BLM botanist.
- Burning would typically occur in the spring or in late summer/fall.
- All burning would be completed only after proper clearances have been provided by the Oregon Department of Forestry and the Lane Regional Air Protection Authority.

2.3.8 Cultural Resources

- No known cultural sites are present in the SRTH WUI project area. If any cultural sites are found during any element of project implementation (mowing, mastication, thinning, prescribed burning etc.), activities around the site would immediately halt until a BLM archaeologist reviewed the site and determined appropriate protection measures.

2.3.9 Threatened &Endangered and Sensitive Plant and Fungi Species

- Vehicle access routes, parking locations (including fire vehicles), and landings would be planned ahead of time to minimize potential negative effects to T&E species.

- Work would be supervised by a biologist, botanist, or person skilled in T&E plant identification when required for specific actions and their design features (e.g., certain treatments in the vicinity of T&E plants).
- All fuels reduction treatments would avoid T&E plants by designating a no-entry buffer of at least 1 meter (3.3 ft.).
- All weeding actions would occur 1 meter (3.3 ft.) or more from the nearest known T&E plant; or, weeding less than 1 meter from T&E plants would only occur during their dormant season and while supervised by an individual skilled in T&E plant identification.
- Existing T&E populations would be marked on the ground before actions begin.
- Directional felling and removal, and other methods, would be utilized where necessary to avoid damage to T&E plants.
- Burn piles would be located at least 3.0 meters (9.9 ft.) from T&E plants.
- All planting would occur 1 meter (3.3 ft.) or more from the nearest known T&E plant.

2.4 Alternatives Eliminated From Detailed Analysis

A number of alternatives were considered and discussed based on the results of internal and external scoping. Alternatives are different ways to meet the purpose and objectives, while resolving needs or issues.

Below is a discussion of those alternatives considered but eliminated from further study. This discussion also includes an explanation of why these alternatives did not warrant additional analysis. These alternatives were eliminated from detailed study because they did not meet one or more of the following criteria: 1) the alternative must be consistent with BLM management policies and guidelines 2) the alternative must respond to the purpose of and need for action 3) the alternative must be feasible from a technical and economic standpoint, while remaining environmentally responsible.

Use only hand methods for fuels reduction: The BLM considered this alternative, however, prohibiting the use of mechanical equipment in fuels reduction treatments would severely limit the ability to achieve the objectives of the purpose and need. Treatments would need to be more labor intensive and it would not be possible to effectively reduce fuel loads.

Only treat areas directly adjacent to houses: The BLM considered this alternative but it was not carried forward in detailed analysis because benefits of treatments would not be realized on a landscape level. Fuels reduction objectives would only be accomplished in the vicinity of homes and maintenance of a more fire resistant landscape would not be realized. The ability to respond quickly and effectively to wildfire would not be possible.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section provides the environmental analyses of the biological, physical, social, and economic elements relative to the issues that were identified for the SRTH WUI project. Analysis of the issues would help the decision maker make a reasoned choice between alternatives. Issues are addressed by associating them with the affected resource. For each resource and relevant issue, the setting (Affected Environment) is presented, followed by the effects analysis (Environmental Consequences).

The affected environment describes the existing conditions and trends for the resource elements that may be affected by implementing the SRTH WUI project. It provides the baseline for measuring the potential effects of implementing an action. The environmental consequence of implementing an action predicts the degree to which the elements relative to the issues would be affected by the action. The effects may be beneficial or detrimental; short term or long term; and direct, indirect, or cumulative. The description of the current conditions outlines the effects of past and current land management activities undertaken within the project area.

Reasonably Foreseeable Actions

The SRTH WUI Project area contains the largest parks in the City's natural areas system, with a network of soft-surface trails at its core. In the coming 10-20 years, as outlined in the Rivers to Ridges Vision (2003), Ridgeline Area Open Space Vision and Action Plan (2008), Willamalane Park and Recreation Comprehensive Plan, and available site management plans, the City and Willamalane would continue to manage the sites for native habitat, low-impact recreation, ecosystem function, and open space at the edge of the urban area. One to two new parks could be added to the system, ranging from 50-500 new acres. New trails are planned in several parks and would be constructed as funds and staffing allowed; likely in small segments of one to a few miles at a time. Vegetation management would consist of continued maintenance of past projects, mowing, invasive species control, and very limited fuels reduction. More recently acquired sites, in need of vegetation treatments, would be addressed incrementally on the order of 10 acres or similar each year.

3.1. Vegetation

The following issues are addressed in the environmental effects section below:

ISSUE: *How would fuels reduction actions affect native plant communities, sensitive plant species, and sensitive fungi?*

ISSUE: *How would fuels reduction actions affect the spread of noxious weeds and other invasive species?*

3.1.1. Affected Environment

The plant communities in the SRTH WUI project area are characterized by grasslands (prairies and savannas), oak woodlands, and low-elevation conifer forests of the Western Oregon Interior Valleys as described by Franklin and Dyrness (1973). Oregon's Willamette Valley was once comprised of large expanses of prairie and oak habitats, with pockets of Douglas-fir forest transitioning to conifer forests in the foothills of the mountain ranges on the valley borders. Networks of headwater streams and small tributaries originate from the valley's rolling hillsides,

converging downslope and flowing into the mainstem Willamette River (ODFW 2005).

Prairies, savannas, and oak woodlands were maintained by natural and human-caused disturbances; the native Kalapuya peoples burned the prairies frequently to maintain high quality hunting and gathering grounds. As settlers arrived, native habitats were converted to agricultural landscapes, annual burning ceased, and these ecosystems now cover much less than 10 percent of their historic extent; less than 1.5% for prairies and savannas combined, and less than 7% for oak woodland (see map on page 18, ODFW 2005). Following these changes came timber harvests and the introduction of highly invasive non-native shrubs. The decrease in burning, planting and harvesting of timber, and the introduction of invasive shrubs have greatly increased vegetation loads in historically open habitats in the project area.

Prairies, oak savannas and woodlands, mixed oak-conifer woodlands and forests, and conifer forests are found throughout the South Ridgeline WUI project area. A small proportion of the project area hosts seeps, riparian headwater tributaries, and wet prairie. Forest vegetation on individual parcels generally falls into two groups: a matrix of prairie, oak and mixed conifer-oak habitat, or maturing second-growth conifer forest. Within the project area, several sites have a history of logging in the last 20-60 years. Past harvest in these stands, primarily the removal of overstory trees of commercial value, were followed by dense replantings and a lack of management. Today these areas are choked with vegetation, much of which is invasive shrubs. In addition, with the cessation of regular burning, nearly all historic oak habitats in the project area are impacted by encroachment from Douglas-fir, now a common co-dominant species in oak stands.

The major tree species in Willamette Valley oak savannas and woodlands are Oregon white oak (*Quercus garryana*) and California black oak (*Quercus kelloggii)*, with subdominant species including Ponderosa pine *(Pinus ponderosa*), and Pacific madrone (*Arbutus menziesii).* Oak savanna is generally described as a scattered tree canopy of large and open-grown trees (5-30% canopy cover) in a matrix of an herbaceous layer made up of grasses and forbs. Oak woodland ranges from 30-70% cover and has a mix of grasses, forbs, and shrubs in the understory. Common shrub species in oak stands include *Symphoricarpus albus* (snowberry), *Corylus cornuta* (hazel), *Holodiscus discolor* (oceanspray), and *Toxicodendron diversilobum* (poison-oak) (City of Eugene 2013, LCOG 2008, Salix Assoc. 2007). Invasive woody species including Scotch broom (*Cystisus scoparius*), blackberry (*Rubus bifrons*), English hawthorn (*Cratageus monogyna*), and mazzard cherry (*Prunus avium*), among others, have colonized herbaceous areas, woodlands, and forest understories, significantly changing the character of these habitats and greatly increasing the abundance of ladder fuels. The plant composition of upland prairie and savanna or woodland habitat understory is typically dominated by bunchgrasses, including *Festuca idahoensis* ssp. *roemeri* (Roemer's bunchgrass), *Danthonia californica* (California oatgrass), *Elymus glaucus* (blue wildrye), *Achnatherum lemmonii* (Lemmon's needlegrass), and *Koeleria macrantha* (junegrass) (Chappell and Kagan 2001). The spaces between the bunchgrasses are typically covered by mosses, fruticose lichens, or native forbs (Altman *et al.* 2001). Showy, slow-growing perennial forbs include *Eriophyllum lanatum* (common woolly sunflower), *Potentilla gracilis* (slender cinquefoil), *Fragaria virginiana* (wild strawberry), *Sidalcea malviflora* ssp. *virgata* (rose checker-mallow), and *Symphotrichum hallii* (Hall's aster), and the bulbs *Calochortus tolmiei* (Tolmie's mariposa lily) and *Dichelostemma congestum* (ookow). Some fast-growing annual forbs, including various species of tarweed (*Madia* spp.) and *Clarkia*, are also prominent members of the native community (USFWS 2010).

Conifer forests in the project area are characterized by Douglas-fir, with an assortment of sub-dominant species including *Abies grandis* (grand fir), *Calocedrus decurrens* (incense cedar), and *Tsuga heterophylla* (western hemlock), with a sub canopy often comprised by *Acer macrophyllum* (big-leaf maple) and an understory of *Acer circinatum* (vine maple), osoberry (*Oemleria cerasiformis*), and *Polystichum munitum* (sword fern) (Franklin & Dyrness, 1973, Thilenius 1968, City of Eugene 2013, LCOG 2008, LCOG 2009, Salix Assoc. 2007, David Reed & Associates 2000). The conifer forests stands within the analysis area are predominantly even-aged, dense canopied, second growth Douglas-fir forest, established following a previous logging operation in the past 80-100 years. In recent years the shade-tolerant European blackberry (*Rubus vestitus*), has been invading SRTH WUI project sites, increasing ladder fuels frequency and density in these forests. Headwater tributaries begin from depressions in grasslands, or start in shallow drainages up on high slopes. Oregon ash (*Fraxinus latifolia),* big-leaf maple, and red alder (*Alnus rubra*), can occur along headwater tributaries along with the other species listed above. Invasive species in headwater tributaries dominated by hardwoods are the same as described above for oak and mixed-oak habitats; and for areas dominated by conifer are the same as described for conifer forest.

Bureau-Sensitive Plant Species

There are one federally-threatened species and six Bureau-sensitive plant species that occur or may potentially occur in the vegetative communities targeted by the SRTH WUI project. Within the analysis area, 12 of 25 project sites representing 1,595 of 2,339 acres (68%) have been surveyed for these species and presence/absence is known; the remainder of the sites would be surveyed prior to any ground-disturbing activities in the year that treatments were planned (see Chapter 2 for PDF).

Kincaid's lupine (Lupinus oreganum)

Kincaid's lupine is the preferred larval host of federally endangered Fender's blue butterfly (*Icaricia icarioides fenderi*). Only one occurrence of this plant is known in the analysis area; at South Eugene Meadows a patch of Kincaid's lupine occurs under the BPA power lines. Fender's blue butterfly have been surveyed for but not found on this site. Kincaid's lupine is listed by both federal and state entities as Threatened. Critical Habitat is designated for Kincaid's lupine, but none of that area is located on City-owned land within the SRTH WUI project area.

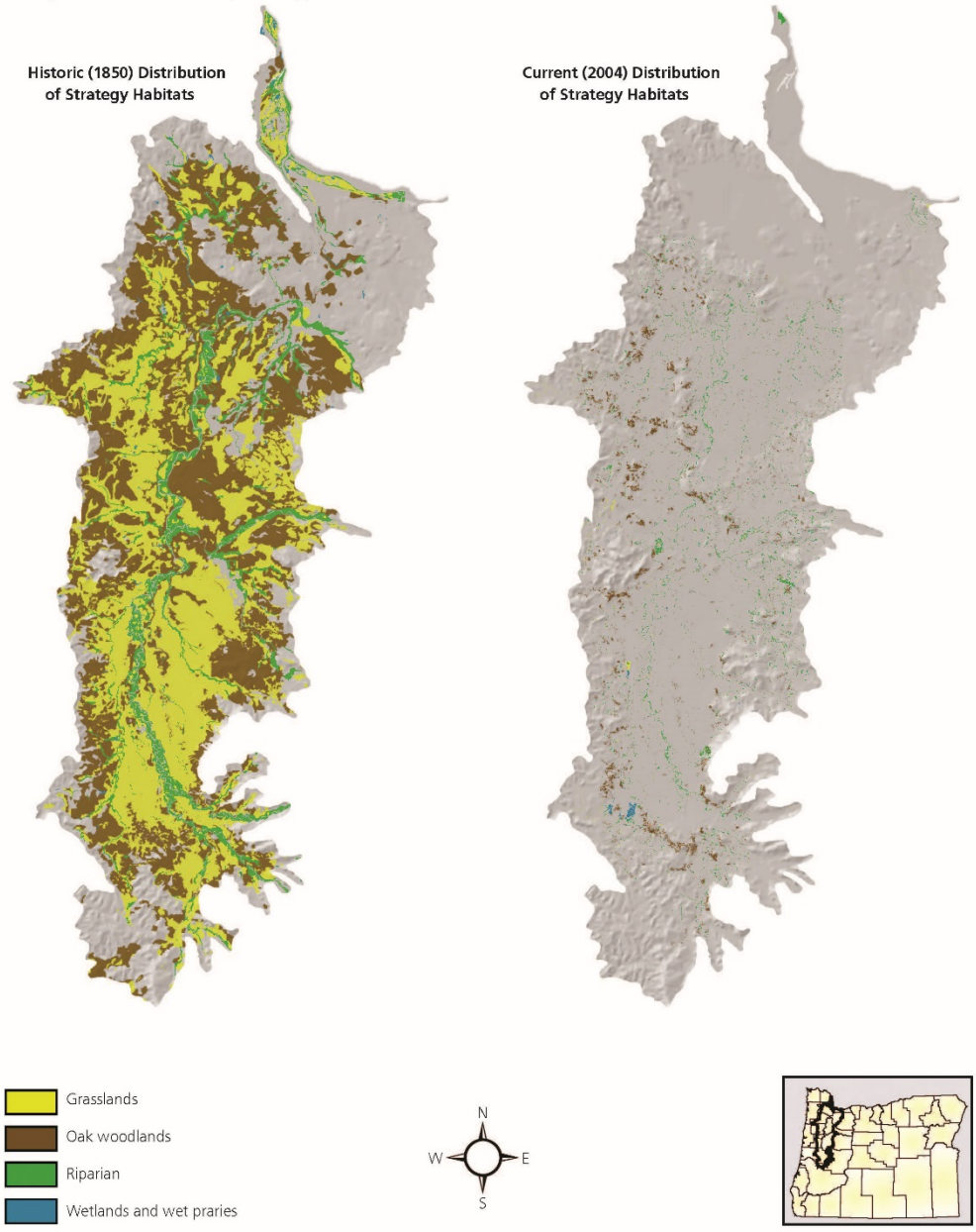
A complete summary of the conservation status, population trends and distribution, life history and ecology, habitat characteristics, threats/reasons for decline, and conservation measures for Kincaid's lupine is available in the Recovery Plan for the Prairie Species of Western Oregon (USFWS 2010). It is identified as a Strategy Species for the Willamette Valley in the Oregon Conservation Strategy (ODFW 2005).

Map of historic Willamette Valley habitats, Oregon Conservation Strategy (ODFW 2005).

Summary List of Strategy Habitats

Strategy Habitats in the Willamette Valley ecoregion include: oak woodlands, grasslands (including oak savanna), wetlands (including wet prairies), riparian, and aquatic habitats.

Change in Willamette Valley Strategy Habitats



Data Source: Oregon Natural Heritage Information Center, 2004.

Wayside aster (Eucephalis vialis)
Wayside aster an herbaceous perennial with very limited distribution; it is found only in Lane and Douglas counties in Oregon. It is a Species of Concern for the U.S. Fish and Wildlife Service and an Oregon Threatened species. Wayside aster is found in openings in forests where light reaches the forest floor, either through openings in the canopy or via the forest edge, and can also be found along roadsides and on herbaceous balds. The Oregon Conservation Strategy lists limiting factors for wayside aster as habitat loss from residential development and timber harvesting, fire suppression and resulting encroachment of brush in the forest understory, invasive plant species, road maintenance, habitat fragmentation, and off-road vehicle use. It recommends management and restoration of known occupied sites, surveys for new populations, and limiting road maintenance during the growing season (ODFW 2005).

Populations can be found in areas as open as recent clearcuts to mature forests (Newton et al. 2010), and flower production and plant vigor are inversely correlated with canopy cover (Wogen 1998 in Newton et al. 2010). Although wayside aster persists as the canopy closes, plants are often reduced in stature and do not flower. A recent study on improving conditions for extant wayside aster populations found that forest canopy thinning improved plant vigor and reproduction (Newton et al. 2010). Wayside aster is known to occupy the Thurston Hills area.

A complete summary of the conservation status, life history and ecology, habitat characteristics, current species situation, threats, and conservation measures for wayside aster is available in the BLM Instruction Memorandum No. OR-99-27: Survey and Management Recommendations – Vascular Plants (U.S. Department of Agricultural & U.S. Department of Interior, 1999).

Shaggy horkelia (Horkelia congesta ssp. congesta)
Shaggy horkelia is a federal Species of Concern, and a candidate for state listing. In the Willamette Valley shaggy horkelia grows on gravelly soil or dry ground, it can grow in elevated portions of wet prairies, dry uplands, and along the dripline of oaks and Douglas-fir (Gisler 2004). Shaggy horkelia is endemic to western Oregon, with extant populations are now centered on the Eugene and Roseburg areas (Blakely-Smith and Kaye 2012). In the SRTH WUI project area, this species is not known to occur on any of the SRTHWUI project sites.

A complete summary of the conservation status, population trends and distribution, life history and ecology, habitat characteristics, threats/reasons for decline, and conservation measures for shaggy horkelia is available in the Recovery Plan for the Prairie Species of Western Oregon (USFWS 2010).

Hitchcock's blue-eyed-grass (Sisyrinchium hitchcockii)
Hitchcock's blue-eyed grass is a federal Species of Concern. It is found in valley grasslands and oak savannas in the Willamette Valley, where like other grassland species it is threatened by habitat loss and conversion to other uses. It is a perennial forb, blooming mid-May to July, and is pollinated by solitary bees (Henderson 1976 in USFWS 2010). Nearly all documented occurrences in the Willamette Valley are in the Eugene area.

A complete summary of the conservation status, population trends and distribution, life history and ecology, habitat characteristics, threats/reasons for decline, and conservation measures for Hitchcock's blue-eyed-grass is available in the Recovery Plan for the Prairie Species of Western Oregon (USFWS 2010).

Timwort (Cicendia quadrangularis)
Timwort is a very small (<10cm) annual forb found in wet, open areas. In the Willamette Valley, it's found in wet prairie or seepy areas lacking dense vegetation. Its range is Oregon and California. It is uncommon in Oregon due to its habitat requirements. It is not listed federally or in Oregon, but it is considered extremely rare and is listed as imperiled (rank 2) by ORBIC. Timwort is known at one project site in the analysis area, Suzanne Arlie Park, where occurs at the edge of an old road in the powerline corridor.

Thin-leaved peavine (Lathyrus holochlorus)
Thin-leaved peavine is a federal Species of Concern that occurred historically in the ecotone between prairie or savanna and oak woodland habitats, and today is also found along roadsides and in fencerows (NatureServe 2011). Its range is restricted to the Willamette and Umpqua valleys in Oregon. Total population estimate within its range in Oregon is approximately 8,000 individuals in 75 occurrences. Populations are very small and most average fewer than 50 individuals. Plant species often associated with thin-leaved peavine include Oregon white oak (*Quercus garryana*), bigleaf maple (*Acer macrophyllum*), Douglas fir, nootka rose (*Rosa nutkana*), poison oak (*Rhus diversiloba*), Hall's aster (*Aster hallii*), and vetches (*Vicia* spp.). Threats to thin-leaved peavine include roadside mowing and herbiciding, loss of habitat due to conversion to agricultural and urban uses, woody vegetation encroachment, and invasive species including those which thrive in similar settings to thin-leaved peavine, Himalaya blackberry and Scotch broom. Although thin-leaved peavine can spread rhizomatously, it is also thought to be an obligate outcrossing species, with very limited seed production observed in some populations. Isolation small populations from one another may limit available pollen for seed production (NatureServe 2011). Thin-leaved peavine is not known on any of the sites in the South Ridgeline portion of the project area, however, it is located within the Thurston Hills area.

Clustered goldenweed (Pyrrocoma racemosa var. racemose)
Clustered goldenweed is a perennial forb, with erect stems and yellow flowers. It is found in wet prairie habitats and seeps in uplands, and its range includes Oregon and California. It is very rare in Oregon, considered at risk of extirpation by ORBIC (Rank "2", ORBIC 2013), but it is not listed federally or in the state of Oregon. It is known on one of the project sites, Wild Iris Ridge.

White-topped aster (Sericocarpus rigidus)
White-topped aster is a perennial forb listed as a federal Species of Concern and threatened in the State of Oregon. It is usually found in well-drained upland prairies, oak savannas, and oak woodlands, but in Lane County can also occur in wet prairie. It is clonal, reproducing mostly vegetatively and may be limited by inbreeding depression. It has become rare due to habitat loss, alteration of disturbance regimes, and habitat invasion by trees, shrubs, and non-native weeds (USFWS 2010).

A complete summary of the conservation status, population trends and distribution, life history and ecology, habitat characteristics, threats/reasons for decline, and conservation measures for white-topped aster is available in the Recovery Plan for the Prairie Species of Western Oregon (USFWS 2010). White-topped aster is not known to be present at any of the project sites.

Bureau Sensitive Fungi

It is unknown if Bureau Sensitive fungi are present in the hazardous fuels reduction units because the BLM has not surveyed the units for fungi. Suitable habitat exists for some species in some of the forested units; although, it is unlikely populations are present because of their rarity across the analysis area.

Activities that remove overstory trees or remove, disturb, or compact the top layer of organic material or mineral soil negatively impact fungi. The main and most extensive part of a fungus consists of a mycelia network that resides in the top few inches of mineral soil. Mycelial networks often connect multiple trees through their root systems. In one study, mycelia networks ranged in size from 1.5 to 27 square meters (Dahlberg and Stenlid 1995).

3.1.2. Environmental Effects (Direct and Indirect)

Alternative 1: No Action

Under the No Action Alternative, prairies, oak savannas and woodlands in the analysis area that have been colonized by invasive shrubs and native and non-native trees would not be treated and would remain in a high density condition. Ladder fuels and planted areas not typically part of these systems would continue to contribute to overstocked woody vegetation, encroaching further into currently open understory and herbaceous-dominated areas. In conifer forests and woodlands, overstocked stands would continue on the same trajectory, with vegetation growing increasingly decadent.

BLM Sensitive plant species potentially affected by this project all prefer open prairie habitat, edge, or forest openings. Under the no action alternative, conditions for sensitive plant species would stay the same or decline. Habitat quality would continue to be poor and habitat could be lost due to continued canopy closure.

Under the no action alternative, invasive species would continue to proliferate in the SRTH WUI project area, and would be expected to spread from their current extent into open areas remaining in woodlands, savannas, and prairies. European blackberry would be expected to spread in conifer woodlands and forests. The City would be able to conduct low-level annual maintenance, equivalent to current efforts.

Cumulative Effects

These effects would annually increase the risk of a stand-replacing crown fire in the project area, and would contribute to the existing decline in the presence of native prairie, oak savanna, and oak woodland plant communities and associated animal species in the Willamette Valley.

Alternative 2: Fuels Reduction

Implementation of Alternative 2 would reduce understory density in various amounts depending on existing site-specific conditions, and would remove invasive shrubs and trees primarily in mixed oak-conifer and oak woodland stands, with some prairie and conifer forest areas also treated. The SRTH WUI project proposes up to 1,700 acres of vegetation removal for fuels hazard reduction, of which 940 acres involve removal of encroaching Douglas-fir, hardwoods, and invasive shrubs from historically more open oak woodland, savanna, and prairie habitats, approximately 735 acres involve removal of invasive species and small trees from conifer forest and woodland, and 25 acres are in hardwood woodlands. Invasive woody shrub densities,

encroaching conifer trees, and overstocked hardwoods would be reduced. Thinning and reducing the density of understory shrubs and subcanopy trees in oak and conifer forests would remove decadent wood, promote wider shrub and tree spacing, which improves plant vigor, and reduce the risk of a crown fire.

Under this alternative, conditions would be improved for BLM sensitive plant species, all of which depend on ample light for survival; some requiring herbaceous-dominated habitat such as prairie, oak savanna, or low-cover oak woodland, and others requiring edge habitat or large openings in the canopy. Known occurrences of Kincaid's lupine, wayside aster, Hitchcock's blue-eyed grass, and timwort would be avoided by any ground-based equipment during implementation, following the details outlined in the PDFs. Their surrounding habitat would receive reductions in shrub and tree cover if needed, improving habitat quality for colonization by these species, and reducing the potential that their existing locations would be impacted by invasive vegetation. While it is possible that an unknown occurrence of one of the BLM sensitive species may be unknowingly impacted by the SRTH WUI project, it is very unlikely. PDFs described in Chapter 2 identify that all project areas would be surveyed for these species prior to work commencing. Furthermore, the project design features limit work until after these species have largely flowered and set seed, completing their annual life cycle. In addition, because the City has already completed vegetation inventories in several of the project sites, presence or absence of these species in many of the locations is known.

Thinning would only remove understory shrubs and small (< 12 in. DBH) to moderate-diameter (12-20 in. DBH) trees. Fungi may develop mycorrhizal associations with early seral trees, but the majority of associations have likely developed over time with later seral conifers, which would not be removed as part of this project. Thinning to remove hazardous fuels in oak, mixed-oak conifer, and conifer forest habitats would reduce potential impacts to fungi, if present, in the event of a high intensity wildfire. Reducing fuel loads is expected to minimize the risk of a high intensity, stand-replacing wildfire. A lower intensity, lower severity fire would cause less potential damage to soil, duff, and fungal mycelia. The objective of fuels reduction is to return fire regimes to more natural, historic conditions. Because fungi evolved with the plant communities where they occur, they are likely adapted to the historic fire regime and have strategies to survive wildfire events, such as fruiting outside the window of naturally occurring wildfires and establishing extensive mycelial mats that increase the odds that hyphae would persist in unburned or lightly burned areas.

While thinning would reduce the risk of damaging fungi from high intensity wildfire, burning handpiles and out-of-season underburning could pose some risk to Bureau Sensitive fungi, if present in the units. Burning concentrated piles of slash creates an intense burn in localized areas. If rare fungal mycelia are present beneath slash piles, they could be damaged during burning. The estimated amount of area impacted by burn piles is 1-2% of the total area. The preferred method for dealing with cut vegetation would be to haul it to landings, grind it, and remove it from the site. However, this treatment would not be possible at every site, depending on slope, access, and presence of all-season gravel roads. Therefore, some material would be piled for burning. Because they are rare and because the area impacted would be a small percentage of the landscape, the likelihood of Bureau Sensitive fungi being present under one of the piles is small. Mycelia form extensive underground mats and a 6-foot by 6-foot pile would not likely cover an entire mycelia. Over time the mycelia would reestablish connections with the fine roots of conifers.

Prescribed burning would carry fire across the landscape and would not create intense localized effects like pile burning would. Intensity would depend on seasonality, soil and vegetation moisture content, and other environmental conditions. Prescribed burning would not occur in forested stands, so it would have no potential effects on Bureau Sensitive fungi in those areas. The risk of damage to Bureau Sensitive fungi from prescribed burning in prairie and oak habitats would occur from more intense burns in patchy areas that result in consumption of thatch, duff and potential scorching of soil. Loss of litter and organic matter results in reduced moisture retention capability, loss of nutrient sources, and changes in fungal species diversity and abundance (Amaranthus et al. 1996). Burning in late fall and spring when fungi are fruiting could also result in damage to sporocarps and short-term reduction of reproductive capacity. These effects would be short-term and small scale due to the patchy nature of such burns.

Cumulative Effects

The absence of fire, forest harvest and replanting, and encroachment of invasive shrubs within these project areas has created the need for fuels reduction treatments on these acres. The proposed action would remove overstocked and invasive shrubs and trees, reduce the risk of stand-replacing fire, and improve the health of residual stands across all cover types. Oak-dominated stands would receive the benefit of maintaining those species as the dominant overstory species. Overall habitat quality for BLM sensitive species would be improved, and invasive species would be reduced.

These actions would contribute to the landscape-scale restoration happening in the Eugene area and throughout the Willamette Valley, supporting ongoing efforts by other agencies including conservation organizations such as The Nature Conservancy, watershed councils, and land trusts, all of whom are working alongside local, state, and federal government agencies to protect, restore, and manage these legacy ecosystems. Over the last decade a number of efforts to identify the highest priority areas for conserving Willamette Valley ecosystems and species have identified protection and restoration of prairie, oak savanna, oak woodlands, and headwater streams as critical conservation needs by the Oregon Watershed Enhancement Board, the Northwest Power and Conservation Council, Oregon Department of Fish and Wildlife (ODFW), ODF, the U.S. Fish and Wildlife Service (USFWS), The Nature Conservancy (TNC), Partners in Flight, ORBIC, and the Pacific Coast Joint Venture. Locally, the Rivers to Ridges Partnership, of which BLM is a founding member agency, has identified the value of these systems in multiple regional vision documents and site-specific management plans.

3.2. Wildlife

ISSUE: *How would treatment disturbances (noise, presence of humans) and the timing of that disturbance affect migratory bird nesting and migration, as well as other wildlife species?*

3.2.1. Affected Environment

Willamette Valley prairie and oak ecosystems host a wide variety of animal species including several endemic to the Willamette basin (Christy and Alverson 2011, Floberg et al. 2004, Alverson 2005, Vesely and Rosenberg 2010). Many species are experiencing population declines tied to the loss or significant degradation of their habitat, with notable guilds including grassland birds, oak cavity nesters and other oak-associated species (Altman and Stephens 2012, ODFW 2005). Habitat loss and fragmentation have been identified as the major limiting factors affecting most of the listed and at-risk terrestrial wildlife species in the Willamette Valley

(USFWS 2010, Vesely and Rosenberg 2010, Primozich and Bastasch 2004). Conifer forests in the analysis area, although somewhat small in size (5-200 acres) also support some BLM sensitive species.

There are four BLM sensitive animal species that could to occur in the types of stands or vegetative communities targeted by the SRTH WUI project; only two, bald eagle, is actually known to be using the project area.

Bald eagle (Haliaeetus leucocephalus)

Bald eagle is an Oregon Threatened species. Once listed as federally endangered due to reproductive failure associated with use of the pesticide DDT, habitat loss, and illegal shooting, bald eagle populations recovered with removal of these stressors. Downlisted to threatened status in 1995, it was formally delisted in the lower 48 states in 2007.

Widespread across Oregon, localized bald eagle abundance reflects food availability and weather conditions. Bald eagles use large river systems, lakes, and reservoirs for forage, and would also use terrestrial systems if prey are available. In Oregon and the southern Willamette Valley, they are common in winter and early spring, as breeding residents, wintering birds, and spring migrants are all present (Marshall et al. 2003). Resident populations occur where food is abundant and migrate or travel in search of food if needed (Marshall et al. 2003). Communal roosts occur in winter; a roost close to the analysis area is known at Fern Ridge Reservoir in the West Eugene Wetlands.

Breeding pairs are uncommon to rare in most areas of the state (Marshall et al. 2003). Bald Eagles nest along waterbodies, building very large stick nests in the canopy of nearby forests. Nests can be up to seven feet across and five feet deep. Eagle pairs mate for life and return to the same nest each year, adding material and mending the nest as needed. Shoreline is an important component of nesting habitat; in Oregon, 84% of nests are within 1km of water (Anthony and Isaacs 1989 in Marshall et al. 2003). Eagles select the tall, live trees with open canopy structure that supports their nest and provides a vantage point (Marshall et al. 2003). In western Oregon, nest trees are typically Douglas-fir or Sitka spruce.

Bald Eagles consume a variety of prey, taken both alive and scavenged. Fish, waterfowl, and small mammals are common prey; in the Willamette Valley a study of roosting wintering birds showed that they overwhelmingly consumed domestic sheep remains (~95%), with waterfowl and small rodents making up the remainder of bald eagle diet (DellaSala et al. 1989 and Marr et al. 1995 in Marshall et al. 2003). Detailed information on nesting bird foraging habits is not known.

An occupied bald eagle nest is present at Skinner Butte, the northernmost site in the project area, located in a Douglas-fir forest adjacent to the Willamette River. No fuels reduction actions are planned on the north slope of Skinner Butte, where the bald eagles have nested for several years.

A complete summary of the life history and ecology, habitat characteristics, threats/reasons for decline, and conservation measures for the bald eagle is available in the Pacific Bald Eagle Recovery Plan (USFWS 1986).

Oregon vesper sparrow (*Pooecetes gramineus affinis*)

Oregon vesper sparrow is a federal Species of Concern and a state Candidate Species in Oregon. Additionally, it is identified as a Strategy Species for the Willamette Valley in the Oregon Conservation Strategy (ODFW 2005). Oregon vesper sparrows migrate to the southern US or Mexico in winter, and breed in the Willamette Valley in spring and summer. Although no research has been undertaken on Oregon vesper sparrows in the Willamette Valley, recent resurveys of grassland bird monitoring points in 2008 by ODFW found that this species has declined significantly in the Willamette Valley since 1997, dropping in total abundance, relative abundance, and unobserved in half of the areas it was found during the earlier survey (Myers and Kreager 2010).

Oregon vesper sparrows primarily use open habitats with sparse shrubs (<25% of total cover), grass cover height 12-24 inches (Myers and Kreager 2010) and perches above the herbaceous canopy are used for singing (Altman 1997). They appear to be more responsive to differences in vegetation structure than the composition of plant communities (OWI no date), although diverse vegetation and native insects provide diverse food sources. The habitat patch size needed usually is greater than 5 acres. The Oregon Conservation Strategy lists limiting factors for Oregon vesper sparrows as small disjunct populations, impacts to grasslands from fire suppression and invasive species, nest failure due to human land management practices, and predation by house cats. It recommends maintaining and restoring grassland habitat, improving insect (forage) diversity by increasing native plant diversity, invasive species control, and land management practices that minimize disturbance during the nesting season (ODFW 2005).

No Oregon vesper sparrows have been observed to date at any sites within the analysis area. Surveys are actively occurring along properties owned by BLM, the City, and other public and private lands in the area, but all detections of Oregon vesper sparrow are occurring at lower elevations than the SRTH WUI project sites that contain potential habitat for this species.

Lewis' woodpecker (*Melanerpes lewis*)

Lewis's woodpecker was formerly an uncommon to locally abundant breeding species in oak habitats in the Willamette Valley. It began to decline by the early 1960s and the last record of a breeding pair in the Willamette Valley was in the 1970. It also declined elsewhere throughout its range in western Oregon and areas north, its regional extirpation tied to the loss and degradation of oak habitats. Lewis' woodpecker is a cavity-nester which relies on large savanna trees. Restoration of oak savanna is a required landscape element if this species is to return to the Willamette Valley (Altman 2000).

Lewis' woodpecker has been recently documented in winter, using oak habitat near Fern Ridge Reservoir. It occurs as an occasional migrant and wintering bird in the Willamette Valley. Lewis' woodpecker is considered extirpated as a savanna and oak woodland breeding species in the Willamette Valley, however reestablishment is considered possible with improvement in habitat conditions (Altman 2000). Actions that maintain or provide oak or conifer savanna habitat with trees > 24 inches dbh, 1 snag/acre 12 in. dbh, and tree canopy cover 10-40% are recommended (Altman 2000).

Townsend's big-eared bat (*Corynorhinus townsendii)*

Townsend's big-eared bat is a federal Species of Concern and an Oregon Sensitive Critical species. It is an Oregon Conservation Strategy species, and a target species for The Nature Conservancy's Willamette Valley-Puget Trough-Georgia Basin Ecoregional Plan. Little is

known about most bat species in western Oregon. Information on resident bats is limited and even less is known about migratory bat species. Surveys and life history studies are needed for all species, but especially for the species which have a federal Species of Concern status.

Townsend's big-eared bats prefer caves or structures for roosting. They are sensitive to disturbance, so some structures otherwise suitable for their use may have too much associated noise. They can use abandoned structures if they are dry and have access. Townsend's big-eared bats have not been recorded from the analysis area and the closest record is near Fall Creek (Csuti et al. 1997).

The majority of bats in western Oregon use echolocation to feed aerially on insects over or near water, although there may be exceptions. Some species migrate south during the colder months, but most use winter roosts. Tree dwelling species may travel long distances before locating in a more stable-temperature roost (Verts & Carraway 1998). If temperatures are not stable enough, bats may move within the roost or to different roosts to achieve the preferred temperature for maintaining torpor during winter. They may move to a colder roost site during warm winter periods.

In addition to winter roosts, local bat species also use day roosts, night roosts and maternity roosts. Because bats are active at night, they use day roosts for long resting periods during daylight hours. These are protected sites that range from caves to structures to tree cavities to underneath loose shingles or cracks. Night roosting occurs during short periods between foraging, and in different and generally less protected places than day roosting (Verts & Carraway 1998).

Maternity roosts are used by females to raise young (pups) in spring. Depending on the species, some bats raise young individually, and some in small communal roosts. Because oak trees often form cavities, they are suitable for use by bats for roosting – especially if near water. In general, restoration of oak habitats, especially conserving existing cavities and promoting future cavity development, would benefit bats. Restoration activities which cause disturbance should be conducted after annual rearing of pups and after any migrating species have moved through; fall is generally a good time for restoration activities that would meet these guidelines.

3.2.2. Environmental Effects (Direct and Indirect)

Alternative 1: No Action

Under Alternative 1, no fuels reduction would occur. Without removal in the project areas of invasive shrubs and encroaching small trees, oak habitats would continue to decline, and would remain at a higher risk of stand-replacement fire than if the stands were treated. Conifer forest currently hosting a nesting pair of bald eagles would continue at its current level of quality.

Cumulative Effects

Threats to remaining oak habitats continue at the landscape scale for oak-dependent species. Development at the rural-urban interface, continued fire suppression, and small-scale timber harvests would continue to occur near the analysis area. Bald eagles would continue to nest in riparian forests or nearby terrestrial forests of the Willamette River.

Alternative 2: Fuels Reduction

Under the fuels reduction alternative, mixed oak-conifer habitats would be returned to oak dominance and invaded oak savanna would undergo significant removal of encroaching invasive shrubs and trees. This would promote the development of large-diameter open-grown oak trees,

improving nesting site availability for cavity-nesters and bats, and increasing perching habitat for grassland birds such as Oregon vesper sparrow. Fuels reduction treatments would decrease the chances that normally fir-tolerant oaks, would be lost in a stand-replacing fire. Oaks are very slow growing and it would take several decades to a century before large-diameter trees would be present following such a fire.

Cumulative Effects
Projected population increases suggest that there would be a future need, 20 years from now or longer, to increase areas available for residential development in and near the SRTH WUI project area. When this occurs, there would be associated loss of oak or conifer habitat, increasing the importance to wildlife of maintenance of these ecosystem types on public lands.

3.3. Air Quality

ISSUE: *How would pile burning or prescribed burning affect particulate matter concentrations in the airshed?*

3.3.1. Affected Environment

The major source of particulate matter within the project area would come from smoke associated with wildfire starts and resource management activities including prescribed burning (broadcast, hand, machine, and piles) fossil fuel combustion, and dust from the use of natural-surfaced roads and plowing of agricultural land.

Pile burning of woody vegetation and prescribed burning are both activities proposed in the SRTH WUI project. Pile burning would be done in areas where woody vegetation was cleared by hand or by machinery, but material could not feasibly be removed for grinding. Prescribed burning would occur as a maintenance treatment, several years after initial vegetation removal, to maintain low cover by woody species. The SRTH WUI project would conduct all burning actions in compliance with the Oregon Smoke Management Plan (OSMP) (OAR 629-048-0010).

The Willamette Valley experiences periods of air stagnation. When this occurs cold air often becomes trapped near the valley floor with slightly warmer air aloft, creating conditions known as temperature inversions. These conditions result in trapping and concentrating air pollutants near the ground. Wintertime temperature inversions contribute to high particulate levels, often due to wood burning for home heating and fossil fuel combustion. Stagnant periods contribute to increases in ozone levels, causing the local air quality to deteriorate. Under the Oregon Smoke Management Plan (OSMP), the Willamette Valley has been classified for the highest level of protection, and has been designated as a Smoke Sensitive Receptor Area (SSRA).

The bulk of the project area is within the Willamette Valley SSRA. Communities within the project area experience times of reduced air quality during the winter months from wood burning stoves. Smoke from woodstoves and fireplaces can contribute to air pollution in the fall and winter, especially during temperature inversions and periods of air stagnation. Existing sources of emissions include occasional construction and logging equipment, light industrial vehicles, road dust, residential wood burning, campfires, and prescribed fire.

Air quality in the analysis area has been improving over the past decade. Air concentrations of PM2.5, PM10, ozone, and CO in the Eugene-Springfield area have decreased in the last 20 years and have been below National Ambient Air Quality Standards for more than a decade (Lane

Regional Air Protection Agency 2011). The Lane Regional Air Protection Agency (LRAPA) reported in 2011 that, using 1985-1987 as a baseline, the air pollution levels in Eugene-Springfield during 2008-2010 were:

- 65% lower PM10 on worst winter days and 60% lower PM10 as an annual average;
- 25% lower ozone on hot summer afternoons; and
- 80% lower CO in the area of highest traffic congestion.

The most recent annual report from LRAPA indicates that all air quality parameters meet attainment standards (LRAPA 2015).

The BLM has conducted an average of just over 200 acres per year of prescribed burning in the West Eugene Wetlands, an area within the Eugene District that adjoins the analysis area, over the past five years (2011-2015). The City has completed an average of 36 acres per year in the same timeframe. The annual acreage of prescribed burning has varied widely from year to year, in large part because of weather conditions and local restrictions from LRAPA used protect air quality. In many years, wildfires in the Cascade mountains have effects on regional air quality that limit the opportunities for prescribed burning on the Eugene District. As a result, prescribed burning in the planning area is often precluded until late September because of air quality conditions. The City has burned 200-500 hand piles in 2014 and again in 2015 on sites in the analysis area that are also outside the UGB; prior to that the City burned approximately 10-30 hand piles per year.

Wildfires within the project area have been primarily human-caused. Wildfire risk from humans is higher than compared to lightning because the analysis area is highly accessible to the general public via paved and rocked roads and maintained soft-surface recreational trails year around. In 2015, a grass fire started in the analysis area, in dry grass adjacent to a four-lane road. The fire quickly spotted into adjoining forested vegetation and had to be extinguished by ODF using a helicopter with the support of ground crews from numerous agencies. During the same season, several other grass fires started from mowing and sparks on the highway just outside of Eugene. 2015 was an exceptionally hot and dry year that saw repeated shutdowns of forestry industry operations by ODF for fire safety concerns.

3.3.2. Environmental Effects (Direct and Indirect)

The following sections describe the environmental effects of pile burning and prescribed burning as they relate to particulate matter concentrations in the airshed.

Alternative 1: No Action

Under this Alternative, no slash piles would be burned as a result of WUI fuels reduction treatments and no acres would receive prescribed burning as fuels reduction maintenance. Existing limited management actions would continue by City staff and may include pile burning activities but would not include prescribed burning.

The no action alternative would result in increasing levels of wildfire risk in WUI areas due to continued fuel build-up and proximity to ignition sources. Willamalane and City parklands in the analysis area are utilized for recreation and are also near and sometimes directly abutting residential areas. Human activities in these areas, especially during the summer drought period, increase the risk of a conflagration caused by people. Under the no action alternative the project area would continue to be susceptible to wildfire, which has the potential to produce of greatly

increased amounts of particulate matter levels in the air during and directly after a wildfire event. Particulate matter is the main pollutant of concern to the public as carbon monoxide, aldehydes, and the many other compounds emitted by wildfires are found in very low concentrations at short distances away from a fire. Coarse particles about 5 to 10 microns in diameter deposit in the upper respiratory system. Fine particles less than 2.5 microns in diameter (PM 2.5) can penetrate much deeper into the lungs. Exposure to fine particles in the air increases the chances of respiratory and cardiovascular illness, may aggravate asthma and bronchitis, and may have carcinogenic effects to humans. The effects of breathing wildfire smoke include eye and throat irritation, shortness of breath, headaches, dizziness, and nausea (USDA Forest Service 2013).

No slash piles would be created or burned under this alternative, and prescribed fire would not be used as a maintenance tool. The project would not add particulate matter to the atmosphere in the summer or winter for the 1-5 days during which such treatments would occur.

Cumulative Effects

No permanent sources of particulate matter production exist on Willamalane/City lands within the project and air quality and visibility is thought to be good, except during brief weather inversions which typically occur in the winter. Activities such as residential wood burning and traffic exhaust on private and public lands throughout the project area may have localized impacts of short duration. Smoke created from wood burning would continue as a source of air pollution and may affect those individuals with asthma, respiratory or heart conditions, or other illnesses, especially during inversions or times of stagnated air. Oregon DEQ has developed a statewide woodstove program to promote the use of cleaner burning woodstoves and to help home owners burn wood more efficiently and with less pollution.

Private home owners in the project area would continue to reduce hazardous fuels under the Oregon Forestland-Urban Interface Fire Protection Act. Burning on private timber lands within and adjoining the project area would continue under the guidelines of the Oregon Smoke Management Plan.

Alternative 2: Fuels Reduction

Impacts to air quality from wildfires are closely related to the amount of biomass material consumed (surface and ladder fuel loads) and atmospheric conditions. Wildfires generally occur during the hot, dry summer months when atmospheric conditions are stable and fuels are readily available to burn. A high intensity wildfire with heavy fuel loading could cause a high level of emissions.

Under Alternative 2, fuels reduction activities would reduce the risk of a fire in the SRTH WUI project area, would decrease fuel loads and improve fire response, all of which would decrease particulate matter released into the atmosphere in the event of a wildfire. Firefighters and first responders would be exposed to less dense smoke and particulate matter, both due to reduced fuel loads and ideally quicker containment of a wildfire.

This alternative would include pile burning of hand piles and small machine piles. The need for burning piles would be limited by using shredding, chipping and grinding as much material as possible. Prior to conducting pile burning or prescribed burning activities, the BLM, City, and Willalamane would obtain burn clearances from the appropriate regulatory group. The specific location, number of piles/size of the prescribed burn, fuel loadings, ignition source, time, and duration of ignition would be reported prior to ignition. Smoke management advisories or

restrictions are generated on a daily basis by the state meteorologist. This information is used to determine the appropriate time to conduct the planned pile or prescribed burn. The City, Willamalane, or BLM would only ignite after approvals were obtained, in accordance with the smoke management plan.

The burning of piles generally occurs during the winter months during storm events when unstable atmospheric conditions are present in order to maximize mixing and lessen smoke impacts to localized areas. In addition, all piles are covered then burned when all other fuels are damp. This allows the rapid consumption of target fuels, prevents "nontarget" fuels from burning, and minimizes the amount of residual smoke produced. When prescribed burning is conducted inside an SSRA, the smoke management plan objective is to use best burn practices and prompt mop-up, as appropriate, along with tight parameters for burn site conditions that are intended to vent the main smoke plume up and out of the Smoke Sensitive Receptor Area and minimize residual smoke.

Pile burning for the removal of slash and other woody debris and prescribed burning for the purpose of maintenance of desired stand conditions and would be the only management action under the alternatives that would have a notable effect on particulate matter concentrations in the air. This effect would be largely at the local level because both activities would be implemented in accordance with the OSMP. The OSMP minimizes smoke impacts from pile burning and prescribed fires on local communities and directs smoke away from SSRAs.

Smoke from prescribed burning would have the potential to reach nuisance levels for a short duration in a highly localized area. However, compliance with the OSMP under the alternatives would prevent particulate matter from reaching levels that would be considered a health hazard.

Cumulative Effects

Particulate matter (PM) produced from wildfires limits visibility and can exacerbate health problems. A portion of air borne particulate matter can be less than 2.5 microns in size. These small particles can be most harmful to individuals because they have the ability to penetrate deep into the lungs. If a wildfire were to occur, the emissions could present health concerns to those individuals living downwind and in nearby low lying areas. Symptoms from short-term smoke exposure can range from scratchy throat, cough, irritated sinuses, headaches, and stinging eyes. Persons with asthma, emphysema, congestive heart disease, and other existing medical conditions can have more serious reactions. The elderly and children are also high-risk groups (Oregon DEQ 2009).

There would be no cumulative effects to air resources, as the direct and indirect effects from the projects would be local and of short duration. No other effects in the project areas affecting this resource are anticipated. Based on past experience with broadcast burning and pile burning within this habitat type and adherence to smoke management plans, there are no expected cumulative effects on air quality from the planned fuels treatment under this proposal.

3.4. Fire Risk, Recreation, Rural Interface, and Visual Resource Management

ISSUE: *How would fuels reduction actions affect wildfire risk in areas immediately adjacent to developed areas or infrastructure?*

3.4.1. Affected Environment

Eugene lies at the southern end of the Willamette Valley, sharing a metropolitan area with the City of Springfield. According to U.S. Census Bureau, the City of Eugene has a total area of 40.54 square miles with 40.50 square miles as land. Eugene is the second largest city in Oregon with a population of approximately 156,000. Springfield has a population of approximately 60,000 and a total area of 15.75 square miles.

The SRTH WUI project area contains two distinctive land use patterns: (1) Urban and Urbanizing land; and (2) Rural use. Urban or urbanizing land abuts the north side of the ridgeline, and includes the downtown area up to the Willamette River. These lands lie within the UGB and are developed predominantly with single family homes. Some sizable privately owned areas of undeveloped land can also be found within the UGB and are generally designated and zoned for future residential development, but are characterized by the same conditions as described above for City/Willamalane park sites that are part of this fuels reduction project.

The second land use pattern is found outside of the Eugene-Springfield UGB, primarily on the south side of the ridgeline in the South Ridgeline portion of the project area. These lands contain a mix of low density rural residential, forest and timberlands, and agriculture. The parcels (tax lots) found in the rural area tend to be larger than those located within the UGB and in the South Ridgeline and are generally 5-300 acres in size. Small scale timber and farming practices are common in the undeveloped portions of the South Ridgeline and areas south and west.

Due to the high ridgetops within the SRTH WUI project area, there are critical communication towers scattered throughout and nearby the project footprint. These communication towers provide services for Central Lane County 911, Oregon State Police, 4J School Districts, Federal Bureau of Investigation, Drug Enforcement Agency, and other federal agency radio systems. In addition to communication towers, the Ridgeline is home to several major power transmission lines owned by the Bonneville Power Administration (BPA) and overhead power lines operated by Eugene Water and Electric Board (EWEB). Furthermore, EWEB sources water via a system

of reservoirs located at high elevations in the Ridgeline, often within or immediately adjacent to the City's/Willamalane parklands.

Typical annual rainfall amounts for the Eugene/Springfield area are moderately high to high, with annual rainfall of about 46 inches. However, rainfall is not evenly distributed through the year. Summer months are typically quite dry, often with little to no rain for weeks to months. Vegetation has evolved to go dormant and dry out during the summer, creating conditions that bring together flammable fuels, the highest seasonal temperatures and the lowest humidity, resulting in the highest fire danger. Fire hazards near the Eugene/Springfield Metro Area are highest during prolonged periods of drought, especially after periods of normal to above normal rainfall, which would result in a combination of high fuel loads and unusually dry conditions.

All of the South Ridgeline sites have homes and other buildings positioned adjacent to them. Skinner Butte Park has homes and other structures down slope of the park, including the historic Sheldon-McMurphy House and an 18-story, 222-unit building which houses senior citizens. In general in the South Ridgeline area, there are many homes positioned on ridges above steep slopes of the parks. In Blanton Ridge Park for example, homes are positioned all along the ridge south of the park. Wayne Morse Family Farm has historic structures in the south-western part of the park and homes positioned all around the park. This includes homes uphill on the western boundary. Suzanne Arlie Park is currently a little more remote from homes than the others, but there are homes on high ridges to the west of the park, and areas adjoining the park are being prepared for development. These homes are on 35% or greater slopes on the dry south and southeast aspects with heavy shrub and tree cover, mixed with grass. Those conditions make these homes vulnerable to rapid fire spread from the park. Wild Iris Ridge park has neighborhoods all along the north and east edges of the park on top of a ridge. The homes are not only at a threat of fire spreading to them, but are also threatened by the spotting potential from the shrub and tree fuels from the park. Additionally, the historic Heritage House, the oldest house in Springfield, is located on the north side of the Thurston Hills area and extensive housing developments exist along the entire northern Thurston Hills area boundary.

3.4.2. Environmental Effects (Direct and Indirect)

Alternative 1: No Action

If no fuels reduction activities were conducted, the risk of wildfire would stay as it is or increase over time, as ladder fuels and stand density continue to increase. Currently there are approximately 10,000 people living in areas that could be affected by wildfire along the South Ridgeline area. In addition the University of Oregon is located within the South Ridgeline area project footprint, with a student population of 25,000. A query of Lane County's Regional Land Information Database returned a total of 4,216 single-family or duplex residences and 453 businesses within 0.25 mile of the areas to be treated under the South Ridgeline portion of the SRTH project (City of Eugene 2011).

Residential and business property damage could be impacted by wildfire, for a total building replacement cost of $1.4 billion dollars. Damage or loss of critical infrastructure including power transmission lines, water reservoirs, and communication lines would impact the city and populations around the state. Commerce and economic loss from wildfire damage to critical infrastructure and timber calculate to approximately $9.7 million dollars and $10 million dollars, respectively (City of Eugene 2011). The reservoirs and sensors which help control and monitor flow for water that would be needed in the event of a fire are located within the project area. If

the power transmission system was damaged or destroyed by fire, the immediate area and possibly large regions could be without power until BPA was able to repair the damage.

Frequently visited parks, such as Skinner Butte in Eugene and Quartz Park in Springfield, have grass fuels that would carry a spreading fire mixed with shrubs and dense trees that would produce fire brands. Despite being illegal, the top of Skinner Butte and areas within Thurston Hills are favorite places for local citizens to set off fireworks on July 4, creating very dangerous potential for a wildfire in the park. In a wind these fuels could create spot fires out ahead of the main fire. A fire during late summer or early fall could potentially spot into the adjoining neighborhoods, especially during an east wind event.

Cumulative Effects

The developed areas within Eugene/Springfield and immediately outside it are expected to continue to grow. The population of the Willamette Valley is projected to double by 2050 (Hulse et al. 2002), and existing population centers are likely areas to see this growth. While industrial development is most likely in north and west Eugene, outside the project area, residential some small-business development or infill would continue in the SRTH WUI project area. Wildfire risk would continue with additional recreation pressure on the parklands in the analysis area.

Alternative 2: Fuels Reduction

Under Alternative 2, fuels reduction treatments would decrease the risk and severity of a wildfire occurring in the analysis area, or enable improved containment of a wildfire, which would reduce damages to the residences and businesses in developed areas. Economic impacts would similarly be reduced. Regional water supply, communications towers, and power lines would be less likely to be impacted, decreasing the chances for prolonged disruption in service. There would be short term visual impacts from the proposed action but these would be mitigated by the PDFs.

Burning would be of low intensity and result in a mosaic burn pattern where some areas may burn where other may not. As lower intensity burning promotes development of native grasses and vegetation, the areas would begin sprouting and ground coloration would move from the brown and black to the brighter green of new growth and continue to progress as the seeded or natural vegetation develops.

Cumulative Effects

The SRTH WUI project sites, especially areas hosting degraded prairie and oak-dominated communities, are overstocked with decadent fuels in the shrub and tree layer. The SRTH WUI project would re-establish these areas to a condition where they can be routinely maintained, greatly reducing the risk of a stand-replacing fire and improving the ability to fight a wildfire should one occur in or adjacent to Eugene communities. The City and Willamalene both plan new trails in the project area, opening up 700-1500 acres of parkland to recreational use in the next 10-20 years. Recreational use of the public lands in the project area is anticipated to increase substantially. Fuels reduction actions would aid in minimizing the risk of ignition along new and existing trails. Cumulatively, the actions would not contribute to heightened sensitivity levels or cause the scenic quality of the overall landscape to change in the viewshed.

4. MAJOR SOURCES

4.1. List of Preparers

Name	Affiliation	Title
Eric Johnson	Bureau of Land Management	Deputy Fire Staff Officer
Emily Steel	City of Eugene	Ecologist
Shelly Miller	City of Eugene	Ecological Services Team Supervisor
Jessica Gallimore	Bureau of Land Management	Eugene District Fuels Specialist
Christopher Worthington	Bureau of Land Management	Eugene District NEPA Planner
Eric Wold	Willamalane Park & Rec. District	Ecologist/Assist. *S*uperintendent

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Appendix A 2012 Eugene District BLM Sensitive Species List

Scientific Name	Common Name
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW
BRANTA CANADENSIS OCCIDENTALIS	DUSKY CANADA GOOSE
BRANTA HUTCHINSII LEUCOPAREIA	ALEUTIAN CANADA GOOSE
CYPSELOIDES NIGER	BLACK SWIFT
ELANUS LEUCURUS	WHITE-TAILED KITE
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE
HISTRIONICUS HISTRIONICUS	HARLEQUIN DUCK
MELANERPES LEWIS	LEWIS' WOODPECKER
PELECANUS OCCIDENTALIS CALIFORNICUS	CALIFORNIA BROWN PELICAN
POOECETES GRAMINEUS AFFINIS	OREGON VESPER SPARROW
PROGNE SUBIS	PURPLE MARTIN
ONCORHYNCHUS MYKISS (OREGON COAST)	STEELHEAD
RANA BOYLII	FOOTHILL YELLOW-LEGGED FROG
ACTINEMYS MARMORATA	PACIFIC POND TURTLE
CHRYSEMYS PICTA	PAINTED TURTLE
ANTROZOUS PALLIDUS	PALLID BAT
CORYNORHINUS TOWNSENDII	TOWNSEND'S BIG-EARED BAT
MYOTIS THYSANODES	FRINGED MYOTIS
ALBATRELLUS AVELLANEUS	FUNGUS
ARCANGELIELLA CAMPHORATA	FUNGUS
BOLETUS PULCHERRIMUS	FUNGUS
CHAMONIXIA CAESPITOSA	FUNGUS
CHOIROMYCES VENOSUS	FUNGUS
CORTINARIUS BARLOWENSIS	FUNGUS
CYSTANGIUM IDAHOENSIS	FUNGUS
DERMOCYBE HUMBOLDTENSIS	FUNGUS
HELVELLA CRASSITUNICATA	FUNGUS
MYTHICOMYCES CORNEIPES	FUNGUS
PHAEOCOLLYBIA CALIFORNICA	FUNGUS
PHAEOCOLLYBIA GREGARIA	FUNGUS
PHAEOCOLLYBIA OREGONENSIS	FUNGUS
PSEUDORHIZINA CALIFORNICA	FUNGUS
RAMARIA AMYLOIDEA	FUNGUS
RAMARIA RUBELLA VAR. BLANDA	FUNGUS
RAMARIA SPINULOSA VAR. DIMINUTIVA	FUNGUS
RHIZOPOGON CHAMALEONTINUS	FUNGUS
RHIZOPOGON ELLIPSOSPORUS	FUNGUS
RHIZOPOGON EXIGUUS	FUNGUS
RHIZOPOGON INQUINATUS	FUNGUS
ANDREAEA SCHOFIELDIANA	MOSS
BLEPHAROSTOMA ARACHNOIDEUM	LIVERWORT
BRUCHIA FLEXUOSA	MOSS
BRYUM CALOBRYOIDES	MOSS
CALYPOGEIA SPHAGNICOLA	LIVERWORT
CAMPYLOPUS SCHMIDII	MOSS
CEPHALOZIELLA SPINIGERA	LIVERWORT

Scientific Name	Common Name
ENCALYPTA BREVIPES	MOSS
ENTOSTHODON FASCICULARIS	MOSS
EPHEMERUM CRASSINERVIUM	MOSS
EPHEMERUM SERRATUM	MOSS
FISSIDENS FONTANUS	MOSS
HAPLOMITRIUM HOOKERI	LIVERWORT
LIMBELLA FRYEI	MOSS
LOPHOZIA LAXA	LIVERWORT
METZGERIA VIOLACEA	LIVERWORT
PORELLA BOLANDERI	LIVERWORT
SCHISTOSTEGA PENNATA	MOSS
SPLACHNUM AMPULLACEUM	MOSS
TETRAPHIS GENICULATA	MOSS
TREMATODON ASANOI	MOSS
BRYORIA SPIRALIFERA	LICHEN
BRYORIA SUBCANA	LICHEN
CALICIUM ADSPERSUM	LICHEN
ERIODERMA SOREDIATUM	LICHEN
HYPOGYMNIA PULVERATA	LICHEN
HYPOTRACHYNA REVOLUTA	LICHEN
LEIODERMA SOREDIATUM	LICHEN
LEPTOGIUM CYANESCENS	LICHEN
LOBARIA LINITA	LICHEN
MICROCALICIUM ARENARIUM	LICHEN
NIEBLA CEPHALOTA	LICHEN
PANNARIA RUBIGINOSA	LICHEN
PILOPHORUS NIGRICAULIS	LICHEN
PSEUDOCYPHELLARIA MALLOTA	LICHEN
RAMALINA POLLINARIA	LICHEN
STEREOCAULON SPATHULIFERUM	LICHEN
THOLURNA DISSIMILIS	LICHEN
USNEA NIDULANS	LICHEN
AGOSERIS ELATA	TALL AGOSERIS
AGROSTIS HOWELLII	HOWELL'S BENTGRASS
BOTRYCHIUM MONTANUM	MOUNTAIN GRAPE-FERN
CARDAMINE PATTERSONII	SADDLE MOUNTAIN BITTERCRESS
CAREX BREVICAULIS	SHORT STEMMED SEDGE
CAREX COMOSA	BRISTLY SEDGE
CAREX LIVIDA	PALE SEDGE
CAREX MACROCEPHALA	BIGHEAD SEDGE
CAREX RETRORSA	RETRORSE SEDGE
CICENDIA QUADRANGULARIS	TIMWORT
CORYDALIS AQUAE-GELIDAE	COLD-WATER CORYDALIS
CRYPTOGRAMMA STELLERI	STELLER'S ROCKBRAKE
CYPERUS ACUMINATUS	SHORT-POINTED CYPERUS
DELPHINIUM NUTTALLII SSP. NUTTALLII	WILLAMETTE VALLEY LARKSPUR
ERIOPHORUM CHAMISSONIS	RUSSET COTTON-GRASS
ERYTHRONIUM ELEGANS	COAST RANGE FAWN-LILY
EUCEPHALUS VIALIS	WAYSIDE ASTER
FRASERA UMPQUAENSIS	UMPQUA SWERTIA
HORKELIA CONGESTA SSP. CONGESTA	SHAGGY HORKELIA
HYDROCOTYLE VERTICILLATA	WHORLED MARSH-PENNYWORT
IRIS TENAX VAR. GORMANII	GORMAN'S IRIS
LATHYRUS HOLOCHLORUS	THIN-LEAVED PEAVINE
LYCOPODIELLA INUNDATA	BOG CLUB-MOSS
MECONELLA OREGANA	WHITE FAIRYPOPPY
MICROSERIS BIGELOVII	COAST MICROSERIS
OPHIOGLOSSUM PUSILLUM	ADDER'S-TONGUE
PELLAEA ANDROMEDIFOLIA	COFFEE FERN
POLYSTICHUM CALIFORNICUM	CALIFORNIA SWORD-FERN
PYRROCOMA RACEMOSA VAR. RACEMOSA	RACEMOSE PYRROCOMA

Scientific Name	Common Name
RHYNCHOSPORA ALBA	WHITE BEAKRUSH
RIBES DIVARICATUM VAR. PUBIFLORUM	STRAGGLY GOOSEBERRY
ROMANZOFFIA THOMPSONII	THOMPSON'S MISTMAIDEN
ROTALA RAMOSIOR	LOWLAND TOOTHCUP
SCHEUCHZERIA PALUSTRIS SSP. AMERICANA	SCHEUCHZERIA
SCHOENOPLECTUS SUBTERMINALIS	WATER CLUBRUSH
SCIRPUS PENDULUS	DROOPING BULRUSH
SERICOCARPUS RIGIDUS	WHITE-TOPPED ASTER
SISYRINCHIUM HITCHCOCKII	HITCHCOCK'S BLUE-EYED GRASS
SISYRINCHIUM SARMENTOSUM	PALE BLUE-EYED GRASS
UTRICULARIA GIBBA	HUMPED BLADDERWORT
UTRICULARIA MINOR	LESSER BLADDERWORT
WOLFFIA BOREALIS	DOTTED WATER-MEAL
WOLFFIA COLUMBIANA	COLUMBIA WATER-MEAL
CARINACAUDA STORMI	CASCADES AXETAIL SLUG
DEROCERAS HESPERIUM	EVENING FIELDSLUG
PRISTILOMA ARCTICUM CRATERIS	CRATER LAKE TIGHTCOIL
PTEROSTICHUS ROTHI	ROTH'S BLIND GROUND BEETLE
LYGUS OREGONAE	OREGON PLANT BUG
VANDUZEEINA BOREALIS CALIFORNICA	CALIFORNIA SHIELD-BACKED BUG
BOMBUS OCCIDENTALIS	WESTERN BUMBLEBEE
CALLOPHRYS JOHNSONI	JOHNSON'S HAIRSTREAK
CALLOPHRYS POLIOS MARITIMA	HOARY ELFIN
PLEBEJUS SAEPIOLUS LITTORALIS	INSULAR BLUE BUTTERFLY
RHYACOPHILA HADDOCKI	HADDOCK'S RHYACOPHILAN CADDISFLY