Draft Environmental Impact Statement West Eugene Wetlands Resource Management Plan

BLM
Eugene District

Eugene District
Bureau of Land Management

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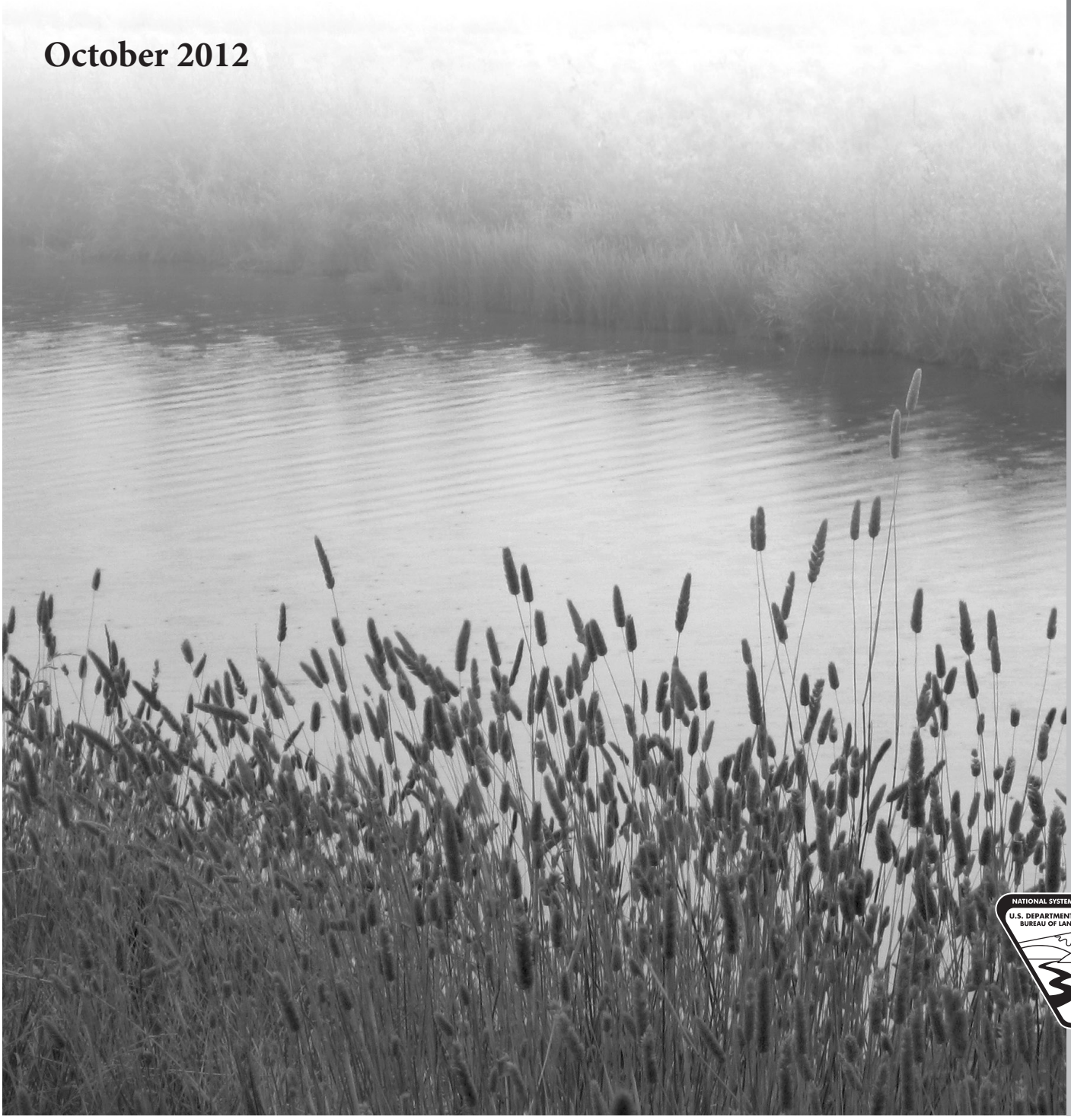

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United States Department of the Interior

Bureau of Land Management

Eugene District Office
P.O. Box 10226
Eugene, Oregon 97440-2226

1610 WEW (OR-E050)

Dear Reader:

Enclosed is the Draft Resource Management Plan (RMP) and Draft Environmental Impact Statement (EIS) for the Bureau of Land Management (BLM) West Eugene Wetlands RMP. With this RMP, we are developing a long-term management strategy for 1,340 acres of BLM-administered lands within and near the city of Eugene, Oregon.

I would appreciate your comments on this Draft RMP/Draft EIS. Your comments will help me develop a proposed RMP and improve the analysis for the Final EIS. Your comments will be most useful to me to the extent they:

- present new information relevant to the analysis;
- present reasonable alternatives other than those analyzed in the draft EIS;
- make suggestions, with a reasoned basis, for the development of a proposed RMP;
- question, with a reasoned basis, the adequacy of, methodology for, or assumptions used for the analysis; or
- question, with a reasoned basis, the accuracy of information in the draft EIS.

It will be less useful to provide comments that are simply votes in support or opposition to a particular alternative, or position statements in support or opposition to particular BLM policies or proposals, without providing reasons.

To be considered timely, comments on this Draft RMP/Draft EIS must be submitted within 90 days of the publication in the Federal Register of the Notice of Availability for this Draft RMP/Draft EIS. Comments can be submitted by mail to: Richard Hardt, RMP Team Leader, to the address listed above in the heading of this document; by electronic mail (email) to BLM_OR_EU_Mail@blm.gov; by facsimile to (541) 683-6981; or in person at the Eugene District BLM office located at 3106 Pierce Parkway, Springfield, OR, 97477, Suite E. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1-800-877-8339 to contact the above individual during normal business hours. The FIRS is available 24 hours a day, 7 days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

All information in your comments including your address, phone number, email address, or other personal identifying information (PII) is maintained as a BLM record. Although your information is

sensitive and protected from public access, it may be made available under a Freedom of Information Act request. You may request in your comment that your PII information be withheld from public review although the agency is unable to guarantee full protection of such information. Please consider all information you may want to include in your comments.

If you have questions please send an e-mail to BLM_OR_EU_Mail@blm.gov; or call Richard Hardt at (541) 683-6600.

Sincerely,

Virginia Grilley
Eugene District Manager

United States
Department of the Interior
Bureau of Land Management
Eugene District Office

Draft Environmental Impact Statement
West Eugene Wetlands Resource Management Plan
Lane County, Oregon

Lead Agency:	Bureau of Land Management
Cooperating Agencies:	City of Eugene Parks and Open Space Division U.S. Army Corps of Engineers The Confederated Tribes of Grand Ronde
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ABSTRACT
The Bureau of Land Management, in cooperation with the City of Eugene Parks and Open Space Division, U.S. Army Corps of Engineers, and the Confederated Tribes of Grand Ronde, proposes to adopt a resource management plan for the BLM-administered lands in the West Eugene Wetlands. This Draft Environmental Impact Statement analyzes in detail the No Action alternative and six action alternatives designed to represent different overall management approaches to achieve the purpose and need for action. The alternatives analyzed would have different effects on contributing to the recovery of threatened and endangered species and different costs of implementation. The BLM preferred alternative is Alternative 2A.

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Summary

The Eugene District of the Bureau of Land Management (BLM) is developing a resource management plan (RMP) for the West Eugene Wetlands planning area, which is comprised of BLM-administered land within and near the city of Eugene, Oregon (see Map 1). The planning area includes the approximately 1,340 acres of BLM-administered land and 96 acres of lands on which BLM has an ownership interest (conservation easement). The planning area is made up of acquired lands or survey hiatuses, and most lands were acquired with funds appropriated from the Land and Water Conservation Fund. Some analyses also reference the planning area boundary, which is the broader geographic area surrounding the planning area, including all land ownerships (see Map 1).

Purpose and Need for Action

The purpose of the action is to manage the planning area to contribute to the recovery of species listed under the Endangered Species Act, while providing other benefits, particularly maintaining the ecological function of wetlands; habitat for other plant and animal communities; and recreation and environmental education opportunities, to the extent compatible with threatened and endangered species management.

The need for the action is established by the U.S. Fish and Wildlife Service Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington, which describes the importance of the planning area to the recovery of Fender's blue butterfly, Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush, and provides recovery strategies and objectives relevant to BLM management. The need for the action is also established in the Federal Land Policy and Management Act, which directs BLM to develop RMPs to provide for the use of public lands. Most of the lands within the planning area are acquired lands which were acquired with funds from the Land and Water Conservation Fund. The justification for the Land and Water Conservation Fund acquisitions typically highlighted the importance of the lands for threatened and endangered species.

Issues

The following issues were identified for detailed analysis:

- How would BLM management actions affect the restoration of native plant communities?
- How would BLM management actions contribute to meeting the recovery targets described in the recovery plan for ESA-listed species?
- How would BLM management actions affect BLM sensitive and strategic plant and animal species?
- How would herbicide use affect soil, water, plants, and animals?
- How would prescribed burning affect air quality?
- How would changing climate conditions alter the effect of BLM management actions on resources?
- How would BLM management actions affect greenhouse gas emissions and carbon storage?

- How would BLM management actions effect archaeological, historical and traditional use resources (trust responsibilities)?
- How would BLM management actions affect access to the planning area, authorizations over the planning area, and authorizations for extractive uses in the planning area?
- How would BLM management actions affect recreation opportunities?
- How much would it cost to implement the alternatives?

The detailed analyses of these issues will serve to focus and format the presentation of environmental consequences and comparison of the alternatives.

Alternatives

This Draft RMP/Draft Environmental Impact Statement (EIS) analyzes in detail the No Action alternative and six action alternatives designed to represent different overall management approaches to achieve the purpose and need for action. The No Action alternative would continue the current management approach into the future with no change in the management actions and level of management intensity in the planning area. The current management approach is described most notably in the BLM West Eugene Wetlands Schedule Environmental Assessment (Schedule EA), which provides a 10-year integrated treatment schedule for some restoration implementation actions. The Schedule EA identified Class 1, Class 2, and Class 3 sites, based on varying qualities of habitat: Class 1 sites being the best existing habitat and Class 3 sites being the poorest.

The design of the action alternatives varies primarily in the amount and location of lands within the planning area that would be allocated to the restoration of threatened and endangered species habitat. The action alternatives also vary in the management emphasis for lands which are not managed for habitat restoration. Additionally, the action alternatives vary in whether herbicides would be included as a management tool.

Under the action alternatives, most or all of the planning area would be allocated to two land use allocations:

- Prairie Restoration Area, which would have a management objective to restore and maintain habitat for prairie-related species.
- Natural Maintenance Area, which would have a management objective to maintain existing resources and provide opportunities for a variety of goods and services.

Alternative 1 would allocate to the Prairie Restoration Area all designated critical habitat and Class 1 and 2 sites, as identified in the Schedule EA. The Prairie Restoration Area would total 1,137 acres under this alternative, or 89% of the planning area.

Alternatives 2A and 2B would allocate to the Prairie Restoration Area all designated critical habitat. The Prairie Restoration Area would total 414 acres under this alternative, or 32% of the planning area.

Alternative 2B would emphasize providing commodities and services to the extent compatible with threatened and endangered species management, and would make approximately two-thirds of the planning area open to saleable mineral development.

Alternatives 3A, 3B, and 3C would allocate to the Prairie Restoration Area all Class 1 sites, as identified in the Schedule EA, that are currently occupied by threatened or endangered species. The Prairie Restoration Area would total 279 acres under this alternative, or 22% of the planning area.

Alternative 3C would enhance recreation opportunities to the extent compatible with threatened and endangered species management. Alternative 3C would include increased recreation developments at the Stewart Pond site, including a disc golf course.

Alternatives 1, 2A, 2B, and 3A would include herbicides among the management tools. However, Alternatives 2A, 2B, and 3A would exclude the Stewart Pond and Eastern Gateway sites from herbicide use. In all alternatives that would include herbicide use, the herbicides available for use would be limited to glyphosate, triclopyr, and clopyralid. In addition, aminopyralid and fluazifop would be considered for Research and Demonstration purposes. In all alternatives that would include herbicide use, application methods would be primarily spot applications with hand applications, and occasionally broadcast applications with booms mounted on tractors or all-terrain vehicles; no aerial application would be permitted. The No Action alternative and Alternatives 3B and 3C would not include any herbicide use.

The currently designated Long Tom ACEC would be included within the Prairie Restoration Area under Alternatives 1, 3A, 3B, and 3C and would not need special management to protect the relevant and important values of the ACEC. Therefore, under these alternatives, the ACEC designation for this site would be removed. Under the No Action alternative and Alternatives 2A and 2B, the Long Tom site would continue to be designated as an ACEC.

Alternative 2A is the BLM preferred alternative.

Affected Environment and Environmental Consequences

The planning area is currently dominated by low quality wet prairie, ash swale/riparian, low quality upland prairie, and oak woodland. No sites in the planning area currently meet recovery targets for prairie quality and diversity. Without herbicide use, prairie and savanna habitats would not be restored to meet high quality habitat conditions. As a result, the No Action alternative and Alternatives 3B and 3C would restore no high quality prairie or oak savanna. Alternative 1 would restore high quality prairie and oak savanna in most of the planning area. Alternatives 2A and 2B would restore high quality prairie and oak savanna in most of the designated critical habitat, and would create the most well-connected network of high quality prairie and savanna habitat of all alternatives. Alternative 3A would restore high quality prairie in most sites currently occupied by listed species.

Three plant species listed as threatened or endangered under the Endangered Species Act are present in the planning area: Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine. Willamette daisy and Bradshaw's lomatium are associated with wet prairie habitat. Kincaid's lupine is associated with upland prairie and oak savanna habitat. The planning area is within the historical range of another listed plant species, golden paintbrush, but there are no known current populations in the planning area. The current populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the Eugene West Recovery Zone meet recovery targets for plant abundance, but not distribution. Under all action alternatives, short-term abundance of all listed plants would greatly exceed recovery targets for abundance. However, the failure to restore high quality prairie and savanna habitat under the No Action alternative and Alternatives 3B and 3C would lead to eventual declines in populations. Alternatives 1, 2A, 2B, and 3A would meet all recovery targets for all listed plants.

One animal species listed under the Endangered Species Act is present in the planning area: Fender's blue butterfly, which is associated with prairie and oak savanna habitats. Current habitat for Fender's blue butterfly in the planning area does not meet the recovery targets for habitat quality or connectivity of habitat. Alternatives 1, 2A, 2B, and 3A would meet Fender's blue butterfly recovery targets for habitat quality and management. Alternatives 2A and 2B would create less high quality habitat for Fender's blue butterfly than Alternative 1, but would create a similarly well-connected network of large patches of habitat. Alternative 3A would not create a network of connected, large patches of habitat for Fender's blue butterfly and would fail to meet recovery targets for abundance and distribution.

Sensitive and strategic plant species in the planning area are associated with similar prairie habitats as the listed plant species. Most sensitive and strategic animal species in the planning area are associated with aquatic habitats or prairie habitats. Short-term populations of all sensitive plants would meet BLM restoration targets under all action alternatives. Under Alternatives 1, 2A, 2B, and 3A, long-term increases in populations of BLM sensitive vascular plant species would contribute to achieving the habitat quality recovery target for listed plants. Habitat for animal species that are associated with high quality prairie and savanna, such as Oregon vesper sparrow and Western pond turtle, would increase under Alternatives 1, 2A, 2B, and 3A. Habitat for animal species associated with oak woodlands, such as Lewis' woodpecker, would decline under all alternatives.

The behavior of herbicides would be influenced by the unique soils and topography of the planning area. Most of the planning area is underlain by a thick, impervious clay with high water-holding and adsorption capacity. Many of the sites in the planning area have flat topography, limiting the potential for runoff. Effects of herbicide use would be limited to Alternatives 1, 2A, 2B, and 3A. The effects of herbicide use would be similar under each of these alternatives, although the areal extent of application would differ.

Concentration of herbicides in the soil would be extremely low because of the limited application methods, low rates of application, and the typical application during warm, dry conditions which would lead to metabolization of herbicides. Off-site transport of herbicides by runoff, sedimentation, leaching, or drift would be extremely unlikely because of the site-specific conditions of the planning area and the

typical application methods. As a result, water concentration of herbicides in the planning area would be far lower than considered in the risk assessments.

Herbicide application would result in some mortality of non-target plants, but mortality would be highly localized because of the application methods and the low likelihood of off-site transport of herbicides. The greatest risk to non-target plants would be to sensitive aquatic plants as a result of an accidental spill of herbicides in water. However, the likelihood of an accidental spill in water would be extremely low, and the effect of any accidental spill would be highly localized. Herbicide application would result in very limited exposure and low risk to most animals. Fender's blue butterfly adults would potentially be exposed to a grass-specific herbicide proposed for Research and Demonstration use, but it is not clear whether exposure to this herbicide would adversely affect Fender's blue butterfly.

The planning area is within a non-attainment area for air quality. Prescribed burning in the planning area is often precluded because of air quality conditions. Alternative 1 would have the greatest particulate emissions and Alternatives 2A and 2B would have the least particulate emissions of all alternatives. Particulate emissions under any of the alternatives would constitute 1% or less of emissions from BLM-administered lands in western Oregon.

The climate of the planning area has been getting warmer over the past century, although the magnitude of warming is less than other locations in the region and less than predicted future warming. Annual precipitation in the planning area has not shown a changing trend, though there have been slight changes in seasonal precipitation. Plant species of high interest would not experience changes in abundance or range as a result of changing climate conditions by 2050 under a moderate climate change scenario. Fender's blue butterfly would be moderately vulnerable to changing climate conditions under a moderate climate change scenario.

There is little information on carbon storage in Willamette Valley prairies. Current carbon storage in the planning area represents less than 0.005% of current carbon storage on BLM-administered lands in western Oregon. Greenhouse gas emissions and carbon storage would vary slightly among the alternatives as a result of the amount of prescribed burning and the thinning of forested plant communities to prairie and savanna plant communities, but emissions would be small compared to other land use sources.

Cultural resources include archaeological, historical, and traditional use sites. No definitive archaeological or historical sites have been found in the planning area, but surveys are incomplete. Nearly all effects to archaeological and historic sites would be reduced or eliminated by conducting pre-disturbance inventories to identify sites and avoiding or protecting identified sites. The Confederated Tribes of Grand Ronde have expressed interest in collecting traditional use plant materials in the planning area, including camas, tarweed, rushes, willows, and hazel. Habitat restoration would generally benefit traditional use plants, but the use of herbicides could adversely affect traditional use plant gathering. Herbicide use would not be allowed under Alternatives 2A, 2B, and 3A on the Stewart

Pond and Eastern Gateway sites, which the Confederated Tribes of Grand Ronde tribe identified as potential sites for traditional use plant gathering.

All parcels in the planning area have legal public access, except for Long Tom, North Taylor, and South Taylor. Access to a majority of the planning area is already provided by existing public roads. Almost all of the planning area is closed to locatable minerals. The extent of right-of-way exclusion areas would vary among the action alternatives with the extent of the Prairie Restoration Area. There would be no effects of locatable or leaseable mineral development under any action alternatives. Under Alternative 2B, saleable mineral development could occur within the Natural Maintenance Area; effects of any future development would depend on specific proposals. All other action alternatives would close the planning area to saleable mineral development.

The landscape of the planning area is highly modified and has a mostly urban or rural setting.
The planning area currently provides recreation opportunities for bicycling, hiking, bird watching, and educational activities. The Fern Ridge Path through the planning area receives consistently heavy bicycle and pedestrian use. The quantity of recreation opportunities would remain unchanged under all alternatives for all sites in the planning area except Stewart Pond under Alternative 3C, which would have substantially increased recreation opportunities.

The average annual budget for BLM administration of the planning area has been approximately $500,000, with an average of $170,000 spent on habitat management. Alternative 1 would have the highest annual cost to implement, because it would have the highest habitat management costs. The No Action alternative would have the second-highest annual costs. Alternative 3C would have low total annual costs, but would have the highest annual costs for recreation maintenance and would have substantial one-time costs for recreation development.

Chapter 1 - Introduction

Overview

The Eugene District of the Bureau of Land Management (BLM) is developing a resource management plan (RMP) for the West Eugene Wetlands planning area, which is comprised of BLM-administered land within and near the city of Eugene, Oregon. The planning area is defined as the geographic area within which the BLM will make decisions through this RMP. The planning area includes the approximately 1,340 acres of BLM-administered land and 96 acres of lands on which BLM has an ownership interest (conservation easement) within and near the city of Eugene, Oregon, described as the West Eugene Wetlands (see Map 1). The planning area is made up of acquired lands or survey hiatuses, and most lands were acquired with funds appropriated from the Land and Water Conservation Fund.

The West Eugene Wetlands RMP will provide comprehensive, long-range decisions concerning the use and management of resources in the planning area. The West Eugene Wetlands RMP will only address management of BLM-administered lands in the West Eugene Wetlands.

The BLM has coordinated its administration of lands in the planning area as part of the West Eugene Wetlands Project (now renamed the Rivers to Ridges Partnership), a cooperative venture by the BLM and other federal, state, and local agencies and organizations to protect and restore wetland ecosystems in the southern Willamette Valley of Oregon. The BLM has been managing BLM-administered lands in the West Eugene Wetlands consistent with a plan developed by the City of Eugene (City of Eugene 2004). However, that plan does not provide management direction specific to the BLM-administered lands and was not developed based on a National Environmental Policy Act (NEPA) analysis.

Planning Process

The BLM planning process is integrated with NEPA compliance. The BLM planning regulations direct, "Approval of a resource management plan is considered a major Federal action significantly affecting the quality of the human environment. The environmental analysis of alternatives and the proposed plan shall be accomplished as part of the resource management planning process and, wherever possible, the proposed plan and related environmental impact statement shall be published in a single document." 43 CFR 1601.0-6. Therefore, the BLM presents this Draft RMP integrated with the Draft Environmental Impact Statement (EIS) as a single document.

Preparing a RMP involves the following nine interrelated actions or steps:

1. Conduct scoping and identify issues
2. Collect inventory data
3. Analyze management situation
4. Develop planning criteria
5. Formulate alternatives

Analyze effects of alternatives

6. Select the preferred alternative; issue Draft RMP/Draft EIS
7. Issue Proposed RMP/Final EIS
8. Sign Record of Decision.

Formal scoping for the RMP started with printing of the Notice of Intent in the Federal Register on June 8, 2011, and concluded on July 8, 2011. The BLM has prepared a scoping report, which summarizes the results of scoping. The Analysis of the Management Situation, which is a brief document for the BLM manager, has been prepared and presented to the BLM manager. The BLM prepared planning criteria, which was distributed for public review on March 14, 2012. The scoping report, other scoping documents, the Analysis of the Management Situation, and Planning Criteria are available at: http://www.blm.gov/or/districts/eugene/plans/eugenermp.php.

Decisions to be made

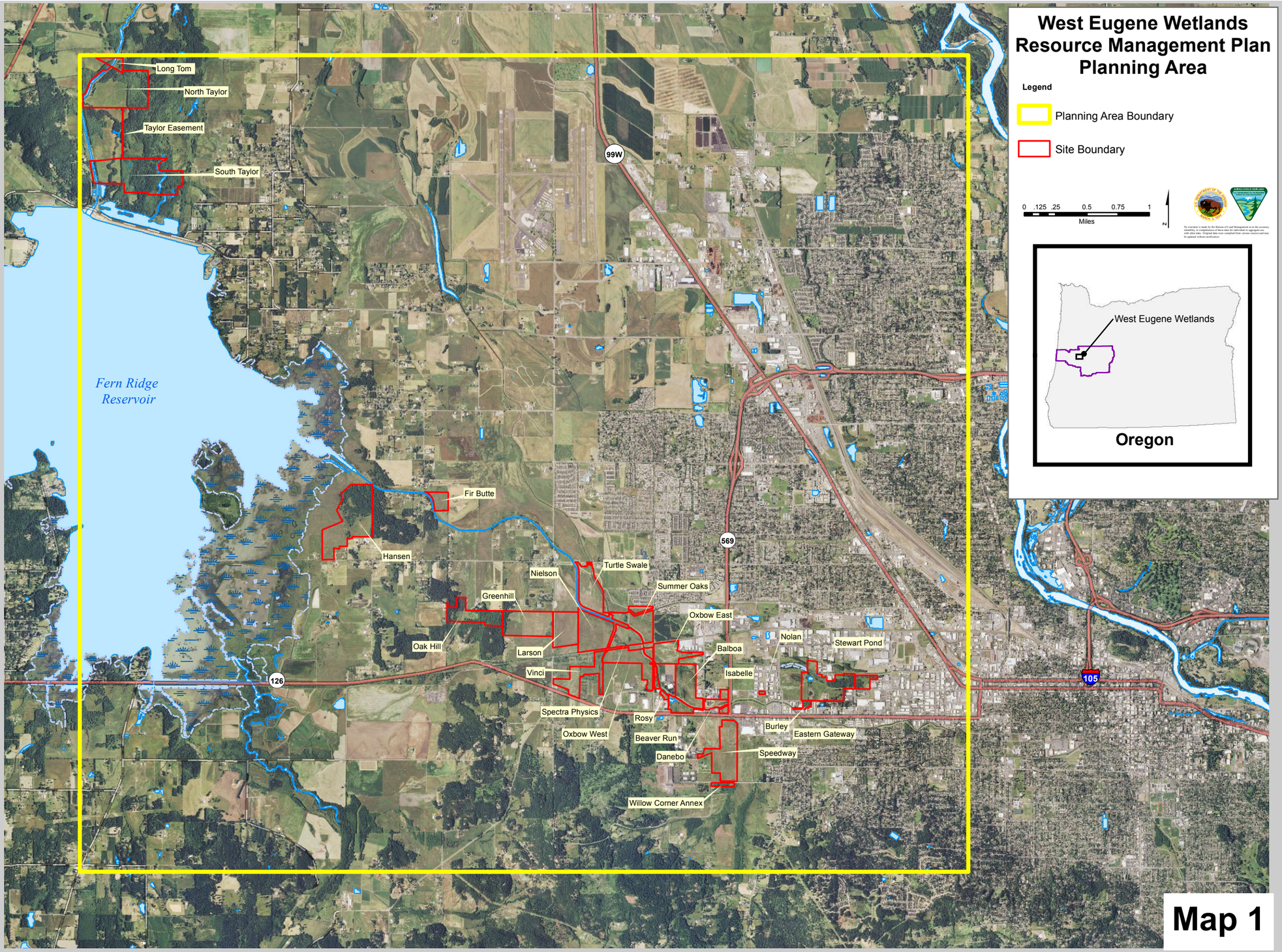
The decision to be made will be the approval of the RMP. As described in the Federal Land Policy and Management Act, RMPs are tools by which "present and future use is projected." 43 USC 1701(a)(2). The BLM's planning regulations make clear that RMPs are a preliminary step in the overall process of managing public lands, and are "designed to guide and control future management actions and the development of subsequent, more detailed and limited scope plans for resources and uses." 43 CFR 1601.0-2.

The major provisions of the RMP will include the following land use plan decisions:

- objectives for the management of BLM-administered lands and resources;
- land use allocations relative to future uses for the purposes of achieving the various objectives; and
- management direction that identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM-administered lands and resources.

In addition to land use plan decisions, the RMP effort will include some implementation decisions. Implementation decisions generally constitute the BLM's final approval allowing on-the-ground actions to proceed. Implementation decisions require site-specific NEPA analysis. While preparing an EIS for an RMP, BLM sometimes considers various implementation actions that would be approved either at the same time or after the RMP decisions are made. The West Eugene Wetlands RMP effort will include implementation decisions related to travel management networks, including identifying the specific roads and trails that will be available for public use and the limitations on use of roads and trails. The West Eugene Wetlands RMP effort may also include implementation decisions on administrative actions, including surveys, sampling, monitoring, and maintenance of facilities, roads, and recreation sites. In the eventual Proposed RMP/Final EIS, the implementation decisions will be clearly distinguished from the land use plan decisions, and the Proposed RMP/Final EIS will describe the administrative remedies for both.

West Eugene Wetlands Resource Management Plan Planning Area



Map 1

Habitat restoration and maintenance actions in the management direction common to all action alternatives, including prescribed burning, mowing, haying, thinning, hand weeding, shade cloth, solarization, thermal treatments, tilling/disking, fill removal, raking, grazing, and plant augmentation, would be implemented only after additional NEPA compliance and decision-making subsequent to the approval of the RMP. Herbicide use described in the management direction for some alternatives, if included in the eventual RMP, would also be implemented only after additional decision-making subsequent to the approval of the RMP. These restoration actions, including herbicide use if included in the eventual RMP, would typically be described in an annual program of work for anticipated actions within the planning area. For this annual program of work, BLM would conduct a Determination of NEPA Adequacy (DNA) to determine whether additional NEPA analysis beyond the analysis in the RMP/EIS is necessary and to evaluate conformance with the RMP. Where site-specific conditions differ, or circumstances change from those described in the RMP/EIS, or if a DNA is inappropriate for other reasons, the BLM may need to conduct additional NEPA analysis prior to reaching a decision to implement an action.

Actions other than habitat restoration and maintenance actions, especially externally-generated actions such as special product permit requests, special recreation permit requests, and right-of-way requests, would typically not be included in an annual program of work, but would be addressed on a case-by-case basis. Such actions would be subject to additional decision-making and NEPA compliance subsequent to the approval of the RMP.

Purpose and Need for Action

The Federal Land Policy and Management Act requires the BLM to develop RMPs to provide for the use of public lands. Among other requirements, the Federal Land Policy and Management Act directs the BLM to use and observe the principles of multiple use in the development of RMPs. There are specific considerations in the planning area that lead the BLM to focus management on threatened and endangered species: the scarcity of the listed species and their habitat; the importance of the planning area to the recovery of the listed species; and the purposes for which the BLM acquired the lands in the planning area. Therefore, the purpose and need for this RMP is more specific than the broad mandate of multiple use alone.

The purpose of the action is to manage the planning area to contribute to the recovery of species listed under the Endangered Species Act, while providing other benefits, particularly maintaining the ecological function of wetlands; habitat for other plant and animal communities; and recreation and environmental education opportunities, to the extent compatible with threatened and endangered species management.

The need for the action is established by the U.S. Fish and Wildlife Service Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington, which describes the importance of the planning area to the recovery of Fender's blue butterfly, Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine, and provides recovery strategies and objectives relevant to BLM management (USFWS

2010). Section 7(a)(1) of the Endangered Species Act requires the BLM to use its authorities to further the purposes of the Endangered Species Act by implementing programs for the conservation of threatened and endangered species and the ecosystems upon which they depend. The BLM Special Status Species Management Manual explains, "Ways in which the BLM can carry out these responsibilities include … Developing and implementing agency land use plans, implementation plans, and actions in a manner consistent with conservation and/or recovery of listed species." (BLM 2008b). The BLM Special Status Species Management Manual further explains that the "BLM will incorporate objectives and actions identified in recovery plans into BLM documents, as appropriate. Examples of such documents include land use plans, implementation level plans, and species conservation plans or agreements." (BLM 2008b). The planning area embraces some of the last remaining rare Willamette Valley prairie habitat, of which less than 1% remains in comparison to historical extent. With so little habitat left, and with more than one-third of the planning area designated as critical habitat for the listed species, it is not likely that recovery of these species can be achieved in this recovery zone without the BLM-administered lands in the West Eugene Wetlands.

The need for the action is also established in the Federal Land Policy and Management Act, which directs BLM to develop RMPs to provide for the use of public lands. Neither the 1995 nor 2008 Eugene District RMPs developed specific goals, objectives, or management direction for the planning area, other than to state that the BLM–administered lands would be managed consistent with the West Eugene Wetlands plan developed by the City of Eugene.

Most of the lands within the planning area are acquired lands which were acquired with funds from the Land and Water Conservation Fund. The justification for the Land and Water Conservation Fund acquisitions typically highlighted the importance of the lands for threatened and endangered species and, for example, specified that that the acquired lands will: (1) Provide a more natural system for water quality enhancement, storm water and flood control; (2) Provide habitat for sensitive plant and animal communities, including rare species; and (3) Provide new opportunities for the recreational and environmental education needs of the community. Almost all of the remaining lands in the planning area were also acquired to provide, in part, habitat for threatened and endangered species.

Major Authorizing Laws and Regulations

This section discusses how the various laws affect management of the BLM-administered lands in the planning area. The planning area includes lands of different status: acquired lands, public domain lands, and O&C lands. Survey hiatuses within the planning area have the status of public domain lands. In addition to the laws presented here, many other legal authorities affect management of BLM-administered lands (see Appendix A).

Federal Land Policy and Management Act (43 USC 1701 et seq.)

The Federal Land Policy and Management Act provides the legal authority to the Secretary of the Interior for the management of public domain and acquired lands. The act requires, in part, that "the public lands scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource,

and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use" (43 USC 1701 [Sec. 102.a.8]). In addition, the act requires that "the public lands be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands" (43 USC 1701 [Sec. 102.a.12]). The act directs that acquired lands "… shall, upon acceptance of title, become public lands, and, for the administration of public land laws not repealed by this Act, shall remain public lands" (43 USC 1701 [Sec. 205.c]).

Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (43 USC 1181a et seq.)
The Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act) provides the legal authority to the Secretary of the Interior for management of the O&C lands. The North Taylor and South Taylor parcels were acquired as part of a land exchange and are O&C lands. The O&C Act requires that the O&C lands "classified as timberlands … shall be managed … for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal [sic] of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." (43 USC 1181a). Section 701(b) of the Federal Land Policy and Management Act states, "Notwithstanding any provision of this Act, in the event of conflict with or inconsistency between this Act and [the O&C Act] …, insofar as they relate to management of timber resources, and disposition of revenues from lands and resources, the latter Acts shall prevail." In this case, the "latter Acts" refers to the O&C Act. The North Taylor and South Taylor parcels contain no timberlands capable of sustained yield timber production. Therefore, there is no conflict with or inconsistency between the Federal Land Policy and Management Act and the O&C Act with regards to the O&C lands in the planning area.

Endangered Species Act (as amended) (16 USC 1531 et seq.)
Section 7 of the Endangered Species Act requires federal agencies to use their legal authorities to promote the conservation purposes of the act. This section also requires federal agencies to consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to ensure that actions they authorize, fund, or carry out will not jeopardize species listed as threatened or endangered under the Endangered Species Act or cause destruction or adverse modification to designated critical habitat for such species. Critical habitat is defined, in part, as geographic areas occupied by the species that contain the physical or biological features essential to the conservation of a species listed under the act and that may need special management or protection.

Clean Water Act (as amended) (33 USC 1251 et seq.)
The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. To accomplish this objective, the statute requires that: water quality standards consistent with the statutory goals of the Clean Water Act be established; water bodies be monitored to determine whether the water quality standards are being met; and, if all of the water quality standards are being met, then anti-degradation policies and programs, including ambient

monitoring, be employed to keep the water quality at acceptable levels. In accord with this statute, the responsibility for establishing these standards, developing a strategy for meeting these standards, and monitoring their attainment in Oregon has been delegated to the Oregon Department of Environmental Quality.

The policy declaration in the Federal Land Policy and Management Act states that the BLM should manage the public lands in a manner that protects many resources and their values, including the water resource (43 USC 1701[a][8]). The Federal Land Policy and Management Act directs that land use plans provide for compliance with applicable State and Federal air, water, noise, or other pollution control laws, standards, or implementation plans (43 USC 1712[c][8]).

In regard to water resources, Sections 303(d), 313(a), and 319 of the Clean Water Act are relevant to management of BLM-administered lands. Section 303(d) (codified as 33 USC 1313[d]) directs the states and tribes to develop a list of waters that fail to meet water quality standards for various constituents including, among others, sediment, temperature, and bacteria. Section 303(d) requires states and tribes to develop total maximum daily loads that apportion a load of pollutants that can be discharged into the waters of a state. The total maximum daily loads determine what level of pollutant load would be consistent with meeting the water quality standards and allocate acceptable loads among sources of the relevant pollutants. Necessary reductions in pollutant loading are achieved by implementing strategies authorized by the Clean Water Act, along with other tools available from federal, state, and local governments and nongovernmental organizations. Section 313(a) (codified as 33 USC 1323[a]) directs that the Federal Government, "(1) having jurisdiction over any property or facility, or (2) engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants," shall comply with requirements for the control and abatement of water pollution. Section 319 (codified as 33 USC 1329) established management programs to control water pollution from nonpoint sources, such as sediment.

Relationship to Policies, Plans, and Programs

The West Eugene Wetlands RMP is being developed independent of the Eugene District RMP. The West Eugene Wetlands are geographically and ecologically distinct from the rest of the BLM-administered lands in the Eugene District, and many of the resources and issues are unrelated to those addressed in the Eugene District RMP. The West Eugene Wetlands contain no timberlands capable of sustained-yield timber production and thus are not a relevant component of the Eugene sustained-yield unit.

The 1995 Eugene District RMP stated:

> The 1992 West Eugene Wetlands Plan governs the management of lands (including BLM lands) located within the "West Eugene Wetlands Study Area" and "West Amazon Drainage Basin" as shown on Map 2, p. 17 of that plan. Except for those provisions of this RMP found in the Resource Program sections for Energy and Minerals, Land Tenure Adjustments, Rights-of-Way, Access and Withdrawals, this RMP does not apply to the West Eugene Wetlands (BLM 1995, p. 16).

The 2008 Eugene District RMP stated:

> Manage BLM-administered lands within the West Eugene Wetlands under the West Eugene Wetlands Management Plan (BLM 2008c, p. 32).

Current Management Direction

The planning area does not have an existing RMP. The Eugene District RMP, as detailed above, does not apply to the planning area, except for a few specific provisions.

In 2005, the Eugene District prepared the West Eugene Wetlands Schedule Environmental Assessment (Schedule EA), which provides a 10-year integrated treatment schedule for some restoration implementation actions (BLM 2005). The current management in the planning area is implementation of the restoration actions described in the Schedule EA and other implementation actions, developed on an *ad hoc* basis. Prior to the preparation of the Schedule EA, the Eugene District had prepared project-by-project analyses for a variety of actions. For example, in 2001, the Eugene District prepared the West Eugene Wetlands Recreation, Access, and Environmental Education Plan (Environmental Assessment OR-090-01-8), which included the grant of a right-of-way to the City of Eugene for the continuation of the Amazon/Fern Ridge Path. In 2012, the BLM signed a decision on the West Eugene Wetlands Threatened and Endangered Plant Augmentation (Environmental Assessment DOI-BLM-OR-E050-2011-0001). These and other past project-specific analyses prepared for the planning area are available online at: http://www.blm.gov/or/districts/eugene/plans/index.php.

In 2005, the BLM published in the Federal Register supplementary rules for public use of the planning area. The supplemental rules address issues of conduct for such things as occupancy, motor vehicle use, firearms and campfires in order to protect the area's natural resources and provide for public health and safety (Final Supplementary Rules for Public Land within the West Eugene Wetlands, Eugene District, OR, 70 Fed. Reg. 43713-43715 (2005).

In 2007, the BLM completed the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement and related Record of Decision, making 18 herbicides available for a full range of vegetation treatments in 17 western states including Oregon (BLM 2007). In 2010, the BLM completed Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement and related Record of Decision (BLM 2010). These environmental impact statements and records of decision are available online at: http://www.blm.gov/or/plans/vegtreatmentseis/documents.php. These tiered environmental impact statements provide a programmatic basis for herbicide application on BLM-administered lands in Oregon, including in the planning area. However, as indicated in these tiered environmental impact statements, any actual application of herbicides would take place only after site-specific analysis and decision-making. Some of the alternatives in this Draft RMP/Draft EIS would include the use of herbicides. For those alternatives, this environmental impact statement would provide the site-specific analysis of herbicide application, tiered to the two programmatic environmental impact statements.

Relationship to non-BLM policies, plans and programs

The BLM has been managing the planning area consistent with West Eugene Wetlands Plan developed by the City of Eugene and Lane County (City of Eugene 2004). However, that plan does not provide management direction specific to the BLM-administered lands and was not developed based on a NEPA analysis. The BLM–administered lands in the West Eugene Wetlands include areas outside of the study area for the West Eugene Wetlands Plan developed by the City of Eugene and Lane County, but the BLM has been managing all of these BLM-administered lands generally consistent with the West Eugene Wetlands Plan developed by the City of Eugene and Lane County (City of Eugene 2004).

As noted above under Purpose and Need for Action, the U.S. Fish and Wildlife Service has completed the Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington (Recovery Plan), which describes the importance of the planning area to the recovery of species listed under the Endangered Species Act, and provides recovery strategies and objectives relevant to BLM management. Recovery plans generally describe the biology and distribution of listed species; the reasons for the species' listing under the Endangered Species Act; targets conditions at which the species would be considered recovered; and actions needed to promote recovery (USFWS 2010). Recovery plans are guidance documents that do not bind agency action. Nevertheless, the BLM has established the purpose of this RMP to be focused on the recovery of listed species and relies, in part, on the Recovery Plan in establishing the need for this RMP, as detailed above. Therefore, the BLM, as an exercise of its discretion, is developing this RMP to be consistent with the Recovery Plan.

Several West Eugene Wetlands partners - the City of Eugene, The Nature Conservancy, U.S. Army Corps of Engineers, and BLM - have been developing an action plan to describe management goals and management actions for Fender's blue butterfly, Kincaid's lupine, Willamette daisy, and Bradshaw's lomatium in the West Eugene Wetlands, beyond the Recovery Plan goals and targets. A draft of the action plan was prepared in 2012 but has not yet been finalized (City of Eugene et al. 2012). The action plan, if finalized, does not represent a decision on the part of BLM and would not bind agency action

The BLM mows vegetation at sites within the Eugene city limits to comply with city code. The Eugene city code requires property owners to trim vegetation if:

- grass and weeds are over 10 inches;
- trees and shrubs block sidewalks, alleys and sidewalks;
- blackberry vines extend into a public right-of-way or cross property lines; or
- any vegetation obstructs traffic visibility (Section 6.815).

Planning area sites within the City of Eugene, including Stewart Pond and Eastern Gateway sites, have a Natural Resources overlay zone and wetland buffer overlay under state planning. As such, mining could not be conducted on these sites under State law (T. Taylor, City of Eugene, *personal communication*, April 24, 2012).

Collaboration

The Federal Land Policy and Management Act and NEPA provide direction regarding coordination and cooperation with other agencies and governments. The Federal Land Policy and Management Act emphasizes the need to ensure coordination and consistency with the plans and policies of other relevant jurisdictions. NEPA provides for what is essentially a cooperative relationship between a lead agency and cooperating agencies in the NEPA process. Cooperating agency status provides a formal framework for governmental units—local, state, tribal, or Federal—to engage in active collaboration with a lead Federal agency to implement the requirements of NEPA. Formal cooperators in the preparation of this RMP/EIS are the U.S. Army Corps of Engineers, the City of Eugene Parks and Open Space Division, and the Confederated Tribes of Grand Ronde. The BLM also invited the U.S. Fish and Wildlife Service to be a cooperating agency in the preparation of this RMP/EIS, but they declined.

The BLM invited potentially affected tribes - the Confederated Tribes of Grand Ronde, Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, the Confederated Tribes of Siletz Indians, and the Confederated Tribes of Warm Springs - to participate in government-to-government coordination in the development of this RMP. Members of the RMP team have met several times with staff of the Confederated Tribes of Grand Ronde to provide more information on the RMP and the planning process; discuss development of the RMP; and receive input from the tribal staff.

Issues

In the context of an environmental impact statement, an issue is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. An issue:

- has a cause and effect relationship with the proposed action or alternatives;
- is within the scope of the analysis;
- has not been decided by law, regulation, or previous decision; and
- is amenable to scientific analysis rather than conjecture.

Issues point to environmental effects; as such, issues can help shape the proposal and alternatives.

Scoping

Scoping is a term used in NEPA for determining what issues an environmental impact statement should address. Guidance from the Council on Environmental Quality explains, “The purpose of this process is to determine the scope of the EIS so that preparation of the document can be effectively managed. Scoping is intended to ensure that problems are identified early and properly studied, that issues of little significance do not consume time and effort, that the draft EIS is thorough and balanced, and that delays occasioned by an inadequate draft EIS are avoided. The scoping process should identify the public and agency concerns; clearly define the environmental issues and alternatives to be examined in the EIS including the elimination of nonsignificant issues; identify related issues which originate from separate legislation, regulation, or Executive Order (e.g., historic preservation or endangered species concerns); and identify state and local agency requirements which must be addressed.” (Council on Environmental Quality Guidance Regarding NEPA Regulations, 48 Fed. Reg. 34263 (1983)).

The formal scoping period started with printing of the Notice of Intent in the Federal Register on June 8, 2011 and concluded on July 8, 2011. In addition, the BLM sent a scoping letter to 49 individuals, organizations, and agencies that have an interest in BLM management within this planning area. The BLM received thirteen comments during the formal scoping period and one comment after the close of the formal scoping period. Agencies and organizations providing comments included: the Environmental Protection Agency, the City of Eugene Parks and Open Space Division, the Long Tom Watershed Council, the North American Butterfly Association, The Nature Conservancy, Oregon Wild, and Friends of Eugene. All other comments were from individuals. The BLM received a comment after the close of the formal scoping period from the U.S. Army Corps of Engineers. More information on scoping is available in the scoping report, which is available together with the scoping comments on the Eugene District website at: http://www.blm.gov/or/districts/eugene/plans/eugenermp.php**.**

Issues analyzed in detail

Based on scoping and interdisciplinary team discussion, the following issues were identified for detailed analysis:

- How would BLM management actions affect the restoration of native plant communities?
- How would BLM management actions contribute to meeting the recovery targets described in the recovery plan for ESA-listed species?
- How would BLM management actions affect BLM sensitive and strategic plant and animal species?
- How would herbicide use affect soil, water, plants, and animals?
- How would prescribed burning affect air quality?
- How would changing climate conditions alter the effect of BLM management actions on resources?
- How would BLM management actions affect greenhouse gas emissions and carbon storage?
- How would BLM management actions affect archaeological, historical and traditional use resources (trust responsibilities)?
- How would BLM management actions affect access to the planning area, authorizations over the planning area, and authorizations for extractive uses in the planning area?
- How would BLM management actions affect recreation opportunities?
- How much would it cost to implement the alternatives?

The detailed analyses of these issues focus and format the presentation of environmental consequences and comparison of the alternatives in the EIS.

Issues considered but not analyzed in detail

Several issues raised in scoping and described in the scoping report are more accurately presented as questions to be addressed in the formulation of alternatives, rather than disputes based on some anticipated environmental effect. These include:

- Should the existing Long Tom Area of Critical Environmental Concern (ACEC) continue to be designated as an ACEC? Should other areas within the planning area be designated as an ACEC?

- Land Tenure Adjustments: What BLM lands in the West Eugene Wetlands should be identified for retention?
- What would be the BLM land management priorities and capabilities under different levels of funding?
- What management is needed to maintain existing recreation facilities and recreation use of the West Eugene Wetlands? How can the BLM avoid conflicts between recreation use and other resources in the West Eugene Wetlands?
- How can BLM reduce or halt illegal uses in the planning area, such as illegal camping?

These questions were addressed in the formulation of the range of alternatives. For example, each action alternative includes a decision whether to designate or not designate the Long Tom parcel as an ACEC; each alternative would assign each parcel to a land tenure zone, addressing retention and disposal; each alternative includes management objectives and management direction for recreation use.

Environmental impact statements prepared for RMPs typically discuss all resource programs and analyze in detail impacts to all resources present. This RMP has a narrower focus than most RMPs, as explained in the Purpose and Need for Action, and has a smaller geographic scope than most RMPs. Consequently, many resources and programs do not need detailed analysis in this RMP/EIS. The effects of the proposed action and alternatives on many resources were considered in the development of this Draft RMP/Draft EIS, but not analyzed in detail, as explained below. For several of these issues (such as "How would BLM land management affect Wild and Scenic Rivers?"), no analysis was needed beyond identifying that the resources is not present in the planning area. For other issues (such as "How would BLM land management affect visual resources?"), the BLM conducted substantial analysis, including inventory and assessment, before concluding that no further analysis was needed, as described below.

How would herbicide use affect human health and safety?

Some of the alternatives propose the use of the herbicides glyphosate, clopyralid, and triclopyr for control of noxious weeds and invasive plants, and the additional use of the herbicides aminopyralid and fluazifop for limited use for Research and Demonstration. The potential effect of these herbicides on human health and safety, when used for the purposes proposed here and in the manner proposed here, has already been analyzed, as detailed below. The proposed application considered in some alternatives in this EIS would result in no more effect on human health and safety than the effects described in those existing analyses. Those existing analyses, as detailed below, concluded that use of these herbicides would result in low or no risk to human health and safety.

The effects of herbicide use on human health and safety from glyphosate, clopyralid, and triclopyr were analyzed in the Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010), to which this EIS is tiered. The herbicide use contemplated in some of the action alternatives in this EIS and the site conditions of the planning area would not result in any effects on human health and safety from glyphosate,

clopyralid, or triclopyr beyond those effects already analyzed in the Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement. That analysis concluded that glyphosate and clopyralid are in the zero risk category for all accidental exposure scenarios, and that triclopyr presents a low risk under some accidental public exposure scenarios. That analysis is incorporated here by reference (BLM 2010, pp. 343-358). Disputes about the human health effects of these herbicides have been presented to the BLM. For example, comment letters on the Draft Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement argued that glyphosate is carcinogenic and causes genetic damage. The BLM provided responses to these arguments, explaining why these arguments are not compelling and were adequately addressed in the risk assessment for glyphosate. Those responses are incorporated here by reference (BLM 2010, pp. 690-691, 746, 748).

The Forest Service and National Park Service prepared a risk assessment for application of aminopyralid. That assessment found that, based on a generally conservative and protective set of assumptions regarding both the toxicity of aminopyralid and potential exposures to aminopyralid, there is no basis for suggesting that adverse effects are likely in either workers or members of the general public even at the maximum application rate that might be used. That assessment is incorporated here by reference (SERA 2007, pp. 12-71).

The U.S. Environmental Protection Agency prepared a risk assessment for application of fluazifop. That assessment found that fluazifop has low acute toxicity, is mildly irritating, is not a skin sensitizer, and is not likely to be carcinogenic to humans. Thurston County evaluated risks of fluazifop and concluded that a worker both applying and working in treated vegetation in a worst-case exposure could receive more than half the dose of concern through skin absorption (Thurston County 2011). The EPA risk assessment of fluazifop focuses on herbicide use on food crops and for residential use, and the Thurston County risk assessment evaluated a worst-case exposure, which would entail higher application rates and more human exposure than the proposed Research and Demonstration use for control of noxious weeds and invasive non-native and native plants that is proposed in some alternatives in this EIS. The EPA risk assessment concludes with reasonable certainty that exposures for all sources to fluazifop would be below the level of concern and the combined residues of fluazifop from food, drinking water and residential exposures would not likely result in an aggregate risk of concern to any population subgroup. That EPA risk assessment in incorporated here by reference (EPA 2005).

How would BLM land management affect fish populations and fish habitat?

The planning area has habitat for few native fish species, and no habitat for any fish species listed under the Endangered Species Act or any BLM sensitive fish species. None of the alternatives would have any potential for significant impact on fish, other than the effects on water quality which are analyzed in detail.

How would BLM land management affect wildlife other than endangered species and BLM sensitive and strategic species?

The effects of the alternatives on endangered, sensitive, and strategic animal species are analyzed in detail, but numerous other wildlife species are not analyzed in detail. The small geographic size of the planning area makes it unlikely that the proposed action could have a significant impact on any wildlife species other than those strongly tied to Willamette Valley prairie and oak habitats. Because the analysis does analyze in detail the effects on several prairie and oak-related wildlife species, the analysis is indicative of the effects on prairie and oak-related wildlife species more broadly. For wildlife species tied to other habitats, such as Douglas-fir forest, the planning area provides little existing or potential habitat and such habitat are generally abundant within the region, largely eliminating the possibility of significant impacts from the proposed action or alternatives. The effect of the alternatives on migratory birds is addressed in detail by analyzing the effects on several migratory bird species, including dusky Canada goose, Aleutian Canada goose, grasshopper sparrow, Oregon vesper sparrow, and purple martin, in the issue related to sensitive and strategic plants and animals.

How would BLM land management affect the introduction and spread of noxious and invasive plants?

The effect of the alternatives on noxious and invasive plants is analyzed in detail in the context of the effects of the action on native plant communities and the effects of the action on threatened and endangered species.

How would BLM land management affect timber production?

Most of the planning area is in non-forest vegetation, and most of the forested areas would not support sustained-yield timber production. The North Taylor and South Taylor parcels in the planning area are lands under the authority of the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C lands) (43 USC 1181a, et seq). The O&C Act requires that the O&C lands "classified as timberlands … shall be managed … for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal [sic] of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." (43 USC 1181a). Section 701(b) of the Federal Land Policy and Management Act states, "Notwithstanding any provision of this Act, in the event of conflict with or inconsistency between this Act and [the O&C Act] …, insofar as they relate to management of timber resources, and disposition of revenues from lands and resources, the latter Acts shall prevail." In this case, the "latter Acts" refers to the O&C Act. The North Taylor and South Taylor parcels contain no timberlands capable of sustained yield timber production. Therefore, there is no conflict with or inconsistency between the Federal Land Policy and Management Act and the O&C Act with regards to the O&C lands in the planning area.

How would BLM land management affect livestock grazing?
There is no grazing program on the Eugene District. Although grazing might conceivably be used as a tool for habitat restoration and maintenance in future implementation actions, no lands in the planning area are available to be leased for grazing.

How would BLM land management affect fire risk and hazard?
Although prescribed burning would be used as a tool for habitat restoration and maintenance, there is minimal wildfire risk in the planning area. The highly developed and urbanized nature of the planning area ensures that any unplanned ignitions would be quickly and effectively suppressed.

How would BLM land management affect visual resources?
The planning area has been inventoried according to the guidelines for the BLM's visual resource management program. Visual resource management is a system for minimizing the visual impacts of surface-disturbing activities and for maintaining scenic values. The BLM's visual resource management system consists of two distinct components: visual resource inventory classes (Class I through Class IV) and visual resource management classes (Class I through Class IV). Visual resource inventory classes portray the relative quality of visual resources. All sites in the planning area have been assigned to visual resource inventory classes: all sites in the planning area have been assigned to visual resource inventory Class IV, the lowest class of visual quality, except Long Tom, North Taylor, South Taylor, Hansen, Oak Hill, and Fir Butte, which have been assigned to visual resource inventory Class III. Visual resource inventories are on file at the BLM Eugene District. Under all action alternatives, the sites would be assigned to the visual resource management class corresponding to its visual resource inventory class.

The management direction under all action alternatives would be to partially retain the existing character of visual resource management Class III landscapes and to allow major modification of the existing character of visual resource management Class IV landscapes. The action alternatives would not vary in their management direction for visual resources. None of the alternatives would alter the visual character of the landscape in either Class III or Class IV landscapes. The predominant management activity under all alternatives would be habitat restoration and maintenance, which would maintain the existing visual character of the landscape. Some habitat restoration actions, such as thinning of trees in oak woodland or ash swale/riparian plant communities or prescribed burning in wet prairie or upland prairie, would cause some short-term, low levels of visual change, but such visual changes would be consistent with natural ecological changes and would not attract the attention of the casual observer. Therefore, all of the alternatives would maintain the visual character of the planning area and would have no potential for significant impacts on visual resources. Furthermore, the visual intrusions identified in the visual resource inventory indicate that it would not be possible for the quality of visual resources to be improved over time. These intrusions include private building, paved city and county streets, power lines, and other permanent features that would not be expected to change over time.

How would BLM land management affect wilderness characteristics?
There are no lands with wilderness characteristics in the planning area. The planning area is highly developed: public roads are abundant within the planning area boundary and most adjacent lands are managed for agriculture, commercial, industrial, or residential development.

How would BLM land management affect Wild and Scenic Rivers?
There are no designated, eligible, or suitable Wild and Scenic River segments in the planning area.

How would BLM land management affect ACECs?
There is one ACEC within the planning area: the Long Tom ACEC, which is seven acres in size. The BLM has received no nominations, either external or internal, for additional ACECs within the planning area. The effects on the relevant and important values of the Long Tom ACEC of the alternatives would not differ, beyond the effects related to issues that are analyzed in detail, such as plant communities and threatened and endangered species. The effects of the alternatives on the relevant and important values would not differ because the management focus of the Long Tom ACEC would be similar under each alternative, regardless of whether it is designated as an ACEC or allocated to the Prairie Restoration Area.

What would be the economic effects of BLM land management?
Given the small scope of the RMP and very limited potential for commodity production of the planning area, there would be little substantive difference among the alternatives in their economic effects. Under all of the alternatives, including the no action alternative, the predominant BLM management activity would be habitat restoration and maintenance. Although the location of restoration activities and the management tools available would differ among the alternatives, the differences would not be substantial enough to result in meaningful differences in economic effects.

Would BLM land management have a disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations?
Federal agencies are required to "identify and address … disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States" in accordance with Executive Order 12898 regarding environmental justice.

The guidelines described by the Council on Environmental Quality (CEQ 1997) were used to guide the analysis of the potential environmental justice issues associated with the proposed action and alternatives. The analysis included:

- a determination of the geographic distribution of low-income populations and minority populations within the affected area;

- an assessment of whether the impacts of the alternatives produce impacts that are high and adverse;
- if impacts are high and adverse, a determination as to whether these impacts would disproportionately impact low-income populations or minority populations.

The Final EIS for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management analyzed the distribution of minority and low-income population within the planning area. Lane County, in which the planning area for this RMP lies entirely, has a total minority population of approximately 11% and a total low-income population of approximately 14%. These percentages are approximately similar to the percentages within the state of Oregon as a whole and below thresholds suggested by Council on Environmental Quality guidance (BLM 2008a, pp. 567-569). That analysis of the distribution of minority and low-income population within the planning area is incorporated here by reference.

The analysis of effects in this EIS found no high and adverse human health or environmental impacts from the proposed action or any alternatives that would fall on any populations. Therefore, there is no need to analyze in further detail whether effects would fall disproportionately on minority or low-income populations.

Vision and Goals

The vision is an expression of long-term desired conditions from an experiential viewpoint. The vision statement for the West Eugene Wetlands RMP is as follows:

The West Eugene Wetlands is a place with a healthy, diverse, and sustainable ecosystem that contributes to the quality of the human environment and provides recreation, education, and traditional uses for people.

Goals are broad statements of desired outcomes that usually are not quantifiable and may not have established time frames for achievement. Land use plan decisions establish goals and objectives for resource management (desired outcomes) and the measures needed to achieve these goals and objectives (management direction). The EIS will examine alternative ways to achieve the goals to the extent allowed under laws and land ownership patterns. The goals for the West Eugene Wetlands RMP are as follows:

Goal 1 – Contribute to the recovery of threatened and endangered species.

The Endangered Species Act applies to plants and animals that have been listed as endangered or threatened, those proposed for listing, and designated and proposed critical habitat.
The purposes of the Endangered Species Act applicable to BLM land use planning are:

(1) Provide a means to conserve the ecosystems upon which endangered species and threatened species depend;
(2) Provide a program for conservation of endangered species and threatened species.

The Endangered Species Act requires all federal departments and agencies to conserve endangered and threatened species while utilizing their authorities to achieve these purposes.

Goal 2 - Restore and maintain native plant communities and associated wildlife species.
Under the Federal Land Policy and Management Act, the BLM manages public lands in a manner that will preserve and protect certain public lands in their natural condition and provide food and habitat for wildlife. The objective of the BLM Special Status Species Policy is to ensure BLM management actions are consistent with conservation needs of special status species and do not contribute to the need to list any Special Status Species under the provisions of the Endangered Species Act (BLM 2008b).

Goal 3 – Identify, preserve, and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations.
Under the Federal Land Policy and Management Act, the BLM manages public lands for historical and archeological values. The National Historic Preservation Act requires BLM to administer federally owned, administered or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations.

Goal 4 – Provide recreation opportunities.
Under the Federal Land Policy and Management Act, the BLM manages public lands for outdoor recreation use. Substantial recreation infrastructure has already been developed in the planning area and continued support and maintenance of that infrastructure would continue to provide recreation opportunities.

Goal 5 - Make public lands available for special uses including traditional plant collection and needed rights-of-way.
Under the Federal Land Policy and Management Act, the BLM manages public lands for human occupancy and use. The BLM regulates human occupancy, use, and development of the public lands through permits, easements, and rights-of-way.

Goal 6 – Restore and protect water quality.
Under the Federal Land Policy and Management Act, the BLM's land use plans must comply with state and federal water pollution control laws. The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The Clean Water Act requires that all RMPs be consistent with state water quality standards.

Chapter 2 - Alternatives

Introduction

Council on Environmental Quality regulations direct that an EIS shall "... rigorously explore and objectively evaluate all reasonable alternatives ..." 40 CFR 1502.14. Guidance from the Council on Environmental Quality further explains, "When there are potentially a very large number of alternatives, only a reasonable number of examples, covering the full spectrum of alternatives, must be analyzed and compared in the EIS." ("Forty Most Asked Questions ..." 46 Fed. Reg. 18027 (Mar. 23, 1981)).

For a resource management plan, there are potentially endless variations in design features or combinations of different plan components. The range of alternatives in this Draft RMP/Draft EIS is intended to span the full spectrum of alternatives that would respond to the purpose and need for the action. The alternatives analyzed were developed to represent overall management approaches, rather than exemplify gradations in design features.

Furthermore, the alternatives analyzed here do not provide all possible combinations of plan components. There are components of the alternatives that are somewhat separable, and the eventual proposed resource management plan may combine management objectives and management direction from several of the alternatives presented in this Draft RMP/Draft EIS.

Alternatives Analyzed in Detail

This section describes the No Action alternative and six action alternatives that are analyzed in detail. The six action alternatives describe a range of approaches to meet the purpose and need for action. These action alternatives examine potential management strategies through utilization of land use allocations, management objectives, and management direction.

- **Land use allocations** are areas where specific activities are allowed, restricted, or excluded in all or part of the planning area.
- **Management objectives** describe the desired outcomes from management of a particular resource.
- **Management directions** provide measures that will be applied to planning activities to achieve the management objectives for resources.

No Action Alternative

The No Action alternative would continue the current management approach into the future with no change in the management actions and level of management intensity in the planning area. The current management approach is described most notably in the 2005 Schedule EA, the 2001 West Eugene Wetlands Recreation, Access, and Environmental Education Plan, the 2012 West Eugene Wetlands Threatened and Endangered Plant Augmentation, and the 2005 supplementary rules for public use of the planning area (See Chapter 1 "Current Management Approach" for more information).

Because the current management approach was not developed in an RMP, there are no land use allocations, management objectives, or management direction established for the planning area. Nevertheless, the 2005 Schedule EA ranked each site in the planning area as Class 1, Class 2, and Class 3 sites, based on varying qualities of habitat: Class 1 sites being the best existing habitat and Class 3 sites being the poorest (see Map 2); provided objectives, actions, and guidelines for management; and established priorities for implementation (BLM 2005, pp. 58 - 61). Although the objectives, action, and guidelines are not planning management objectives and management direction in the sense of an RMP, they do provide a description of a management approach that can be analyzed here. That description of the management approach is incorporated here by reference. Although the 2005 Schedule EA was described as a 10-year project, the analysis in this EIS assumes that the BLM would continue to implement that management approach indefinitely under the No Action alternative.

The 2012 West Eugene Wetlands Threatened and Endangered Plant Augmentation described an approach to augmentation of existing populations of Bradshaw's lomatium, Willamette daisy, and Kincaid's lupine in the planning area (BLM 2012b, p. 1). That description is incorporated here by reference. The analysis in this EIS assumes that the BLM would continue to implement that approach to plant augmentation indefinitely under the No Action alternative.

Under the No Action alternative, no herbicides would be used in the planning area for any purpose.

Under the No Action alternative, the BLM would continue to implement the 2005 supplementary rules for public use.

Action Alternatives

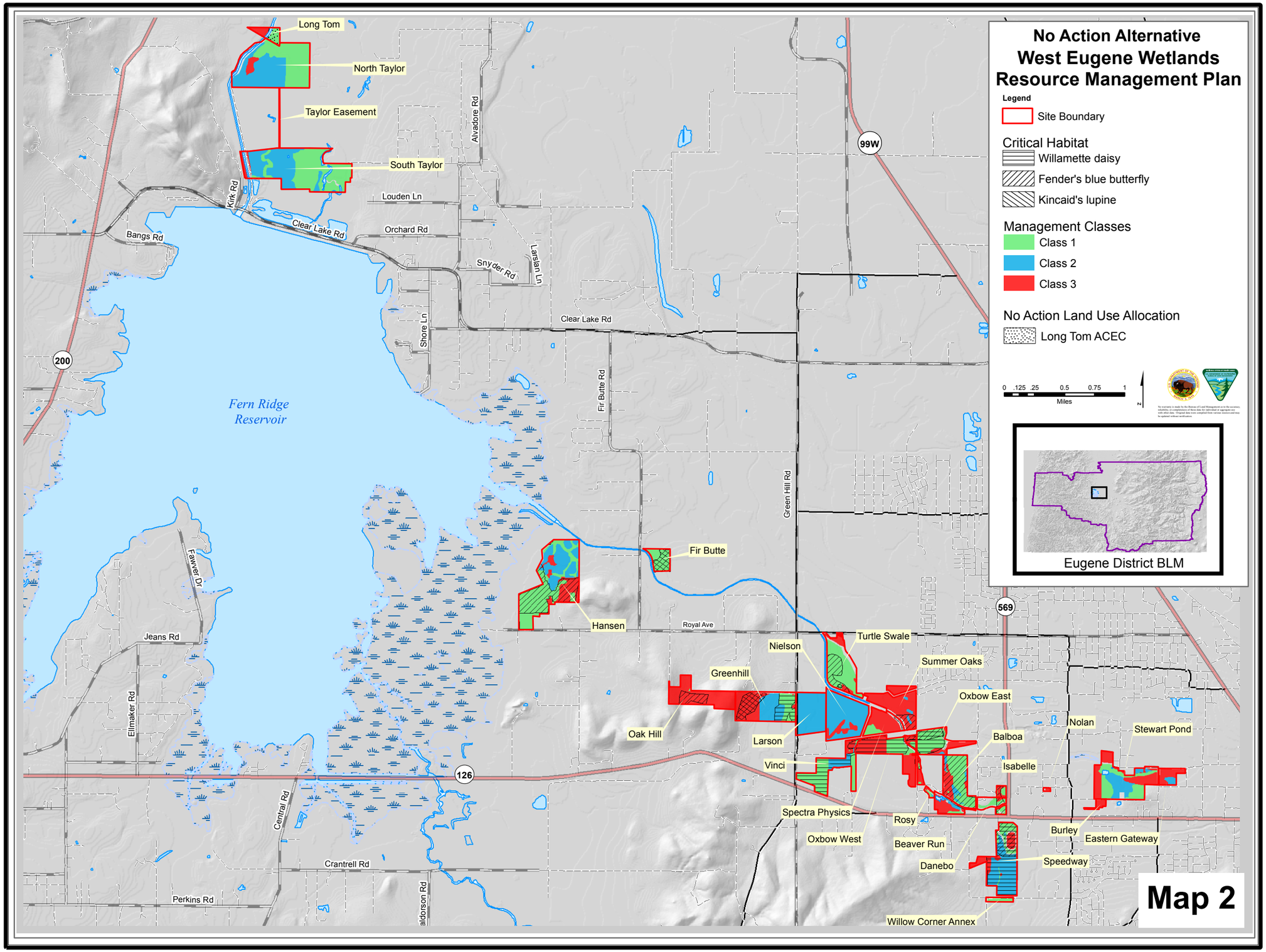
The action alternatives analyzed in detail were developed in response to input received during external and internal scoping. The design of the action alternatives varies primarily in the amount and location of lands within the planning area that would be allocated to the restoration of threatened and endangered species habitat. The action alternatives also vary in the management emphasis for lands which are not managed for habitat restoration. Additionally, the action alternatives vary in whether herbicides would be included as a management tool.

This section describes those features that are common to all action alternatives. The subsequent section describes the land use allocations, management objectives, and management directions that differ among the action alternatives.

Features Common to All Action Alternatives

Under the action alternatives, most or all of the planning area would be allocated to two land use allocations:

- Prairie Restoration Area, which would have a management objective to restore and maintain habitat for prairie-related species.
- Natural Maintenance Area, which would have a management objective to maintain existing resources and provide opportunities for a variety of goods and services.


No Action Alternative
West Eugene Wetlands
Resource Management Plan
Legend
Site Boundary
Critical Habitat
Willamette daisy
Fender's blue butterfly
Kincaid's lupine
Management Classes
Class 1
Class 2
Class 3
No Action Land Use Allocation
Long Tom ACEC
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Map 2
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Turtle Swale
Nielson
Summer Oaks
Greenhill
Oxbow East
Oak Hill
Larson
Balboa
Nolan
Stewart Pond
Vinci
Isabelle
Spectra Physics
Rosy
Oxbow West
Beaver Run
Burley
Eastern Gateway
Danebo
Speedway
Willow Corner Annex
Fern Ridge
Reservoir
Alvadore Rd
Louden Ln
Kirk Rd
Clear Lake Rd
Orchard Rd
Bangs Rd
Snyder Rd
Larsen Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Fairview Dr
Jeans Rd
Royal Ave
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
99W
200
569
126

Variation in the design of the alternatives results from variations in the extent and location of the land use allocations and management direction to resolve the planning issues. These variations are described in the next section for each alternative.

In addition to the above two land use allocations, some alternatives include allocation of the Long Tom ACEC. The management needed to protect the relevant and important values of the Long Tom ACEC would be consistent with the management objectives and management direction identified in the action alternatives for the Prairie Restoration Area. In alternatives that would include the Long Tom site in the Prairie Restoration Area, there would be no need for any special management other than the management applied throughout the Prairie Restoration Area. Therefore, alternatives that would include the Long Tom site in the Prairie Restoration Area would not designate the Long Tom site as an ACEC. Alternatives that do not include the Long Tom site in the Prairie Restoration Area would continue to designate the Long Tom ACEC.

The action alternatives share many of the same management objectives. Given that management objectives are descriptions of a desired condition for a resource, the action alternatives describe the same desired condition for some resources. The analysis of environmental consequences explores whether implementation of each action alternative would achieve the stated objective. In addition, much management direction common to all alternatives represents required management measures or standard operating procedures (see, for example, Appendix C).

Air Quality/Prescribed Burning

Management Objectives

- Avoid impacts to air quality in non-attainment areas.
- Reduce hazards to the public, fire-fighters, and resources from prescribed burning.

Management Direction

- Implement prescribed burns in compliance with Lane Regional Air Pollution Authority and the unit-specific Prescribed Fire Burn Plan.
- Implement prescribed burning in late summer and early fall, when soils have low moisture values, and can support fire-fighting vehicles without damage to the soils.
- Ignite prescribed burns by hand, using propane, fusees, or drip torches.
- Accomplish fire control/suppression with the use of pre-burn hose lays, wet-lining, fire retardant foam, and/or mowing an area approximately 10-20 feet wide around the outside boundary of the burn unit. Avoid fire retardant chemicals or use sparingly near listed plant species and follow labeled restrictions and state regulations or guidelines for use near water.

Plants

Management Objectives

- Maintain and enhance habitat for Willamette daisy and Bradshaw's lomatium to support three populations[1] of each species of at least 5,000 individuals each.
- Maintain and enhance habitat for Kincaid's lupine to support a total of 7,500 square meters of plant cover in three populations that are stable or increasing for 10 years.
- Maintain and enhance habitat for golden paintbrush to support one population of at least 1,000 flowering individuals that is stable or increasing over 5 years.
- Maintain and enhance habitat for the BLM sensitive plants shaggy horkelia, Hitchcock's blue-eyed grass, cluster goldweed, and Oregon timwort to support three populations of each species of at least 5,000 individuals each that are stable or increasing over 10 years.
- Maintain and enhance habitat for the BLM sensitive plant thin-leaved peavine to support one population of at least 1,000 individuals that is stable or increasing over 10 years.
- Maintain and enhance habitat for the BLM sensitive plant white-topped aster to support a population of 7,500 square meters that is stable or increasing over 10 years.
- Maintain and enhance high quality wet prairie for the BLM sensitive mosses *Bruchia flexuosa*, *Ephemerum crassinervium*, and *Ephemerum serratum*.

Management Direction

- Apply the following management tools as needed to restore and maintain habitat: prescribed burning, mowing, haying, thinning, hand weeding, shade cloth, solarization, thermal treatments, tilling/disking, fill removal, raking, grazing, and plant augmentation.
- Implement prescribed burning in late summer or early fall after listed plant species have gone dormant. See *Air Quality* for additional management direction for implementing prescribed burns.
- Mow using tractor mowers or hand-held mowers to control vegetation.
- On sites with listed plants, generally mow in the late summer, fall, and winter, after listed plants have senesced for the season (generally after August 15 through February). Set tractor mower decks sufficiently high to avoid soil gouging (generally 6 inches).

[1] In these management objectives and throughout the analysis of this EIS, "population" is used in the general sense to refer to any discrete group of individuals of a species. From a technical standpoint, "population" would more accurately refer to a group of freely interbreeding individuals sufficiently separated from other groups that there is infrequent or no gene flow. The use of a more general definition of population here maintains consistency with the Recovery Plan usage (see, e.g., USFWS 2010, p. IV-25).

- On sites with listed plants where spring mowing is needed to control overwhelming weed infestations, maintain a buffer of 6 feet from the nearest listed plants if this will meet the management objective. However, if needed to control serious infestations of weeds that reproduce mainly by seed, up to one half of the listed plant population at a site may be mowed in an effort to reduce seed set by non-native weeds. Set tractor mower decks at a level high enough to avoid killing listed plants but low enough to remove weed flowers.
- Apply thinning to control and remove invasive woody plants and reduce tree density. Pile or chip all cut material and spread away from populations of listed plants or haul off-site for disposal or burning.
- Implement hand weeding at any time of year. Generally remove non-native plant material off-site.
- Do not apply shade cloth, solarization, tilling/disking, or fill removal closer than 6 feet to listed plant species.
- Rake as needed to reduce thatch build-up. Rakes may be mounted on rubber tracked tractors or hand-held. Rake after listed plants have gone dormant for the season.
- Apply grazing as appropriate under contract for the purpose of habitat restoration or invasive plant control. If needed for habitat restoration or invasive plant control, graze at low or moderate levels during the dry season (after August 1). Issue no leases for grazing.
- Augment populations of Bradshaw's lomatium, Kincaid's lupine, golden paintbrush, and shaggy horkelia through planting of plugs and seeding.
- Augment populations of Willamette daisy, white-topped aster, Hitchcock's blue-eyed grass, thin-leaved peavine, and cluster goldweed through planting of plugs.
- Augment populations of Oregon timwort by seeding.
- For augmentation of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine, use genetic material derived from within the population in the Eugene West Recovery Zone.
- Do not seed or plant plugs within 6 feet of existing listed plants.
- Implement plant augmentation consistent with the guidelines in the U.S. Fish and Wildlife Service Programmatic Formal Consultation on Western Oregon Prairie Restoration Activities, Biological Opinion (USFWS 2008, pp. 16-18).
- Seed with native upland and wet prairie species to meet prairie diversity recovery targets, especially after ground-disturbing activities.
- Do not operate heavy machinery within 6 feet of listed plants during the growing season of the listed plants (generally February to August).
- Minimize use of heavy equipment, do not apply shade cloth or solarization, and avoid creating thatch within 300 feet of large populations (>100 square meters) of BLM sensitive mosses *Bruchia flexuosa, Ephemerum crassinervium*, and *Ephemerum serratum*.

- Clean all vehicles and heavy equipment to remove mud, debris, and vegetation prior to entering the project area to reduce the spread of noxious weeds and non-native plants.

Wildlife

Management Objectives

- Maintain and enhance habitat for Fender's blue butterfly to support functioning populations that are stable or increasing to meet targets for downlisting and delisting of the species.
- Maintain and enhance habitat conditions for western pond turtles to support populations that are stable or increasing.
- Maintain at least one patch of 200 acres of contiguous high quality wet prairie or upland prairie, and enhance up to four patches of at least 50 acres or more of contiguous high quality wet prairie or upland prairie for grassland birds, such as Oregon vesper sparrow and grasshopper sparrow.
- Enhance forest habitats by increasing abundance of snags in forested plant communities.
- Maintain and enhance 120 acres of oak woodland habitats in patches of at least 15 acres in size for species associated with oak woodlands, such as Lewis' woodpecker.

Management Direction

- Apply the following management tools as needed to restore and maintain habitat: prescribed burning, mowing, haying, thinning, hand weeding, shade cloth, solarization, thermal treatments, tilling/disking, fill removal, raking, grazing, and plant augmentation, as described above under Plants.
- On sites with Fender's blue butterflies, do not mow with tractor mowers in the spring. Mowing with hand-held mowers may be implemented during the butterfly flight season (generally May 1 to June 30) as long as a buffer of at least 25 feet is maintained between the mower and a Kincaid's lupine plant. After the butterfly flight season, but before Kincaid's lupine senescence (generally June 30 through August 15), tractor mowing may occur no closer than 6 feet from the nearest Kincaid's lupine plants. Tractor mowing may be conducted throughout sites with Fender's blue butterflies after Kincaid's lupine senescence and before lupine re-emergence (generally August 15 to March 1). Set tractor mower decks at least 6 inches above the ground to reduce impacts to butterfly larvae.
- Do not mow within ground-nesting and other key bird breeding areas during the nesting season (generally April 15 – July 15).
- Implement prescribed burning on sites with Fender's blue butterfly. The center of the burn unit must be within 300 feet of unburned occupied habitat.

- Raking may be used if burning is not feasible to implement on sites with Fender's blue butterflies. Remove thatch and leaf litter off site.
- At sites with 100 or more Fender's blue butterflies, burn and/or rake no more than one-third of the occupied habitat actively used by butterflies annually. At sites with less than 100 Fender's blue butterflies, burn and/or rake no more than one-quarter of the occupied habitat actively used by butterflies annually.
- Protect any western pond turtle nest sites found during project implementation and during surveys.
- Install silt/drift fences where needed to direct western pond turtles away from project activities. Remove fences after project completion.
- Protect and enhance areas with suitable characteristics for western pond turtle nesting (typically sunny sites on hard, compacted clay soils with south to southwest facing slopes; short, sparse vegetation; and within 500 feet of water bodies). Maintain short vegetation and create bare soil areas for nest excavation. Control woody species to prevent encroachment on nesting areas and reduce shading of nest sites. Recontour soil or augment with other soils if needed to enhance nesting suitability for western pond turtle turtles.
- Create nesting areas for western pond turtle by building upland mounds (typically at least 10 feet wide and 2 to 3 feet high) that have a south or southwest-facing slope. Create mounds from soils excavated on site or from other sites within the planning area after composting or sterilization to remove viable weed seeds.
- Remove barriers to western pond turtle movement. Maintain clear visual and travel paths between water bodies and occupied or potential nesting sites and remove obstructions to movement in aquatic corridors/stream channels, including removal vegetation that could obstruct turtle movement.
- Place logs, large rootwads, or boulders in ponds to create basking sites for western pond turtle.
- Create permanent ponds to enhance western pond turtle habitat.
- Retain large snags and create 2 snags per acre >14" diameter breast height where available in forested plant communities (oak woodland, ash swale/riparian, plantation, and Douglas-fir forest).

Soils and Water

Management Objectives

- Maintain and restore water quality.
- Maintain and restore soil productivity.
- Maintain wet prairie micro-topography on treatment areas.
- Limit soil compaction, displacement and erosion during forest and woodland treatments.

- Maximize wetland water storage to enhance ecological function.
- Prevent soil loss along actively eroding side slopes of streams.

Management Direction

- Apply best management practices as needed to restore or maintain water quality (see Appendix C).
- When using tractor mowers, limit soil compaction by using low ground-pressure equipment.
- To the extent possible while achieving other objectives, limit tractor mowing to times of low soil moisture.
- To the extent possible while achieving other objectives, avoid mowing over ant mounds.
- For thinning implemented with vehicle-supported machinery, use low ground-pressure skid-steer tractors with implements to reduce soil disturbance. Conduct thinning activities during times of low soil moisture (<25%). Design treatment to limit equipment passes across soil surface (such as by using single passes; designing predetermined skid trails; and walking on slash).
- Design ground-disturbing activities to retain organic materials.
- Design excavation of native soils to minimize disturbance to the historic native soil profile.
- Conduct soil-disturbing work during the dry season to minimize compaction. Use low ground-pressure equipment to minimize compaction. Use tilling for decompaction where needed during low moisture soil conditions.
- Retain topsoil on site, if possible. Where feasible, salvage disturbed soil, segregate during storage, compost, and reuse in a similar location and depth. Where feasible, salvage and reuse wetland soils in wetland areas.
- Minimize the disturbance and loss of native soil during sod rolling or fill removal.

Cultural Resources

Management Objective

- Conserve scientific, traditional use, educational, public and recreational values of cultural and resource sites.

Management Direction

- Avoid ground-disturbing actions on sites that are listed (or eligible for listing) on the National Register of Historic Places. Recover scientific value of sites prior to disturbance through practices such as data recovery, which include excavation, relocation, or documentation if avoidance is not practical.
- Classify cultural properties to the following use categories:

  - Classify cultural properties that are determined to be available for consideration as the subject of scientific or historical study as scientific use sites or experimental use sites.
  - Classify unusual cultural properties that are not currently available for scientific or historical study, because of scarcity, a research potential that surpasses the current state-of-the-art, singular historic importance, cultural importance, tribal importance, architectural interest, or comparable reasons as conservation for future use sites. Select sites for the purpose of retaining a representative sample of site types from those available in areas where conflicts with other resource management activities are not anticipated. Preserve these sites.
  - Classify cultural properties known to be important in maintaining the cultural identity, heritage, or well-being of a specified and recognized tribe as traditional use sites. Manage these sites to accommodate their continuing traditional use.
  - Classify cultural properties found to be appropriate for use as interpretive exhibits at their original location (i.e., in place), or found to be appropriate for related educational and recreational uses as public use sites. Priority locations for these interpretive exhibits will include developed recreation sites, recreation corridors, and locations where recreation is being promoted. Preserve these sites.
  - Provide no special management for cultural properties that are only important for their scientific values and whose research potential is effectively exhausted (ones where the salient information has been collected and preserved, or has been destroyed by natural or human activity). These are discharged use sites.
- The use categories for existing sites and new sites may be assigned or changed by comparing the site's characteristics to these use category descriptions.
- Implement protection measures such as stabilization, fencing or withdrawal for sites classified as traditional use, public use or future use when threatened by natural processes or human activity.
- Excavate, and recover the data where warranted by the scientific importance of the cultural sites threatened by natural processes or human activity.
- Implement public interpretation and education around the types of archaeological resources and/or traditional uses found within the planning area.

Recreation

Management Objective

- Provide opportunities for pedestrian and other non-motorized recreational use in the Special Recreation Management Area.

Management Direction

- Designate the Fern Ridge Path as a Special Recreation Management Area for pedestrian and non-motorized vehicle use of the path.
- Manage the Fern Ridge Path Special Recreation Management Area for a community recreation-tourism market.
- Consistent with the Final Supplementary Rules for Public Land within the West Eugene Wetlands, continue to prohibit motorized vehicle use on the Fern Ridge Path, as described below.

Management Objective

- Provide opportunities for pedestrian recreational use in the Extensive Recreation Management Area.

Management Direction

- Maintain existing Tsanchiifin Walk at Balboa and existing trails at Danebo, Stewart Pond, and Eastern Gateway.
- Maintain existing interpretive sites.
- Improve parking access and facilities at Stewart Pond parking lot.
- Consistent with the Final Supplementary Rules for Public Land within the West Eugene Wetlands, continue to prohibit motorized and non-motorized vehicle in the Extensive Recreation Management Area off of the roads designated for vehicle use, as described below and in Appendix F.

Management Objective

- Provide opportunities for commercial, competitive, educational, and organized group activities in the planning area.

Management Direction

- Require Special Recreation Permits for organized groups of 20 or more persons per day within the planning area. Consider applications for Special Recreation Permits for organized group activities only where not in conflict with the management objectives of the site. Do not issue Special Recreation Permits for visits to areas occupied by listed or sensitive species if use would adversely affect listed or sensitive species.

- Continue to apply the Final Supplementary Rules for Public Land within the West Eugene Wetlands, Eugene District, OR, published in the Federal Register on July 28, 2005, which prohibit the following activities in the planning area:
  - littering;
  - entering areas that are posted or otherwise delineated, fenced, or barricaded to close them to public;
  - using or occupying any area one hour after sunset through one hour before sunrise, except traveling on the Fern Ridge Path;
  - discharge of fireworks, firearms, air guns, slingshots or use any other projectile launching device;
  - leaving personal property unattended;
  - using or operating motorized vehicles on the Fern Ridge Path, or operating motorized or nonmotorized vehicles off those roads or paths or parking areas specifically designated for vehicle use;
  - building or using campfires or other open flame fires;
  - possessing, disturbing, or collecting any natural resource unless specifically permitted by the authorized officer;
  - allowing entry of pets or livestock into areas closed to pet or livestock use;
  - possessing or consuming alcoholic beverages; and
  - possessing glass beverage containers.

  Additional information on these restrictions is provided in the supplemental rules (Federal Register, Vol. 70, No. 144, Thursday, July 28, 2005 43713 – 43715).

Visual Resources

Management Objective

- Partially retain the existing character of the landscape in Class III visual resource management areas.

Management Direction

- Designate Long Tom, North Taylor, South Taylor, Hansen, Oak Hill, and Fir Butte sites to visual resource management Class III.
- These sites would be managed to allow for moderate levels of change to the characteristic landscape. Management activities may attract attention, but would not dominate the view of the casual observer. Changes would repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Management Objective

- Allow for major modification of the existing character of the landscape in Class IV visual resource management areas.

Management Direction

- Designate all sites not designated to visual resource management Class III to visual resource management Class IV.
- These sites would be managed to allow for high levels of change to the characteristic landscape. Management activities may dominate the view and may be the major focus of viewer attention.

Special Products

Management Objective

- Provide opportunities for the harvest and collection of special products, such as boughs and branches, edible and medicinal plants, wood products, and firewood.

Management Direction

- Restrict collection amounts and collection activities of special products in a manner that limits adverse impacts to other resources.
- Rotate or restrict areas for the collection of individual products as needed to maintain the availability and sustainability of products, and limit adverse impacts to other resources.

Travel and Transportation

Management Objective

- Provide public and administrative access in a manner that attains resource objectives and supports the agency's mission.

Management Direction

- Manage all of the planning area as a single Travel Management Area.
- Designate all of the planning area as Limited to Designated Roads for off-highway vehicle use. The designated roads available for motorized vehicle use are as follows:
    - the parking area at the Stewart Pond site off of Stewart Road, and
    - the paved entrance road and gravel parking lot at the Danebo site off of South Danebo Avenue (see Map 16 and Appendix F for more detail).

Motor vehicles being used by duly authorized emergency response personnel, including police, ambulance and fire suppression, as well as BLM or BLM-authorized vehicles being used for official duties, are excepted.

- Restrict non-motorized vehicle use to the designated roads identified above and the Fern Ridge Path, consistent with the 2005 supplemental rules.
- Limit use of the Fern Ridge Path to pedestrian and non-motorized vehicle use.
- Limit use of the existing Tsanchiifin Walk at Balboa and existing trails at Danebo, Stewart Pond, and Eastern Gateway described in Appendix F to pedestrian use.

Minerals and Energy

Management Objective

- Manage mineral and energy resources to provide opportunities for exploration and development where consistent with other management objectives.

Management Direction

- Public domain lands (i.e., survey hiatuses) in the planning area would continue to be available for locatable mineral entry under the Mining Act of 1872.
- Include a no surface occupancy stipulation in any leases for leasable minerals.

Lands and Realty

Management Objectives

- Make land tenure adjustments to facilitate the management of resources.
- Manage acquired lands for the purposes for which they were acquired.

Management Direction

- Lands in Zone 1 would be retained under BLM administration. Lands in Zone 1 would include all parcels in the planning area except the Danebo parcel.
- Lands in Zone 2 would be available for exchange. No lands in the planning area would be in Zone 2.
- Lands in Zone 3 would be available for disposal. The only parcel in Zone 3 would be the Danebo parcel, because it is included in Public Law 109-457 (120 Stat. 3392) whereby ownership of this parcel would transfer to the City of Eugene if certain conditions are met. If the conditions are not met, the Danebo parcel will revert back to the United States of America. If the Danebo parcel reverts back to the United States of America, it will be managed under the jurisdiction of BLM, and subsequently the parcel would be transferred to Land Tenure Zone 1 without RMP amendment or revision.

- Any additional BLM-administered lands identified within the planning area boundary shown on Map 1 through the future identification of survey hiatuses would be assigned to Land Tenure Zone 3 and would be available for disposal using appropriate disposal mechanisms.
- Any future unintentional occupancy trespassed lands (including any unintentional realty-related use, occupancy, or developed lands) in the planning area would be assigned to Land Tenure Zone 3 and would be available for disposal using appropriate disposal mechanisms.
- Land tenure zones may be changed without RMP amendment or revision due to congressional action, such as mandated land exchanges.
- Any future land acquisitions within the planning area boundary, if acquired by the BLM under Section 205 or 206 of the Federal Land Policy and Management Act, would take on the status of "acquired lands," and would be managed for the purpose for which they were acquired or consistent with the management objectives for adjacent BLM-administered lands.

Management Objectives

- Continue to make BLM-administered lands available for needed rights-of-way, permits, leases, and easements where consistent with federal, state and local planning goals and rules and the exclusion areas identified in this RMP.
- Provide legal administrative access to BLM-administered lands adequate to support resource management programs.

Management Direction

- Recognize existing rights-of-way, permits, leases, and easements as valid uses (see Appendix B).
- Issue no new rights-of-way in right-of-way exclusion areas identified in this RMP, except for buried lines in the rights-of-way of existing roads, which will be evaluated on a case-by-case basis.
- Outside of right-of-way exclusion areas, evaluate right-of-way and lease requests on a case-by-case basis.
- Issue temporary-use permits, as identified under the Federal Land Policy and Management Act (Section 302), for a variety of uses, such as, but not limited to, stockpile and storage sites and as tools to authorize unintentional trespass situations pending final resolution.
- Issue no new leases or permits for landfills or solid waste disposal sites.
- Utilize land-use authorizations to resolve agricultural or occupancy trespasses, where appropriate.

Hazardous Materials

Management Objectives

- Limit the use of hazardous materials.
- Eliminate hazardous wastes.

Management Direction

- Respond to hazardous material incidents through actions such as cleanup, proper notifications, criminal investigations, and site assessments.
- Store, treat, and dispose of hazardous materials in accordance with applicable laws and regulations.
- Protect employees and the public from known hazardous materials on BLM-administered lands.
- Apply best management practices as needed for spill prevention and abatement (see Appendix C).

Research

Management Objective

- Provide for research to support the management of lands and resources within the planning area.

Management Direction

- Allow ongoing research projects to continue according to current or updated study plans. If management direction on existing study sites conflicts with research objectives, defer implementation of management direction until the research is complete.
- For new research projects, require study plans or project proposals that are consistent with the RMP.

Administrative Actions

Administrative actions are routine transactions and activities that are required to serve the public and to provide optimum management of resources. They would be applied in any land use allocation. Implement administrative actions including, but not limited to the following:

- Facility maintenance
- Improvements to existing facilities
- Road maintenance
- Recreation site maintenance
- Recreation site improvement

- Lands and realty actions (including the issuance and administration of grants, leases, and permits issued under the Federal Land Policy and Management Act)
- Resolution of trespasses
- Hazardous and solid waste materials removal
- Law enforcement
- Surveys to determine legal land or mineral estate ownership
- Engineering support to assist in mapping
- Design of projects including any needed surveys
- Sampling and monitoring, including both non-destructive and destructive data collection
- Incidental removal of trees, snags, or logs for safety or operational reasons.

Roads, maintenance yards, buildings, and other facilities do not have specific management objectives or management direction, but will be managed for the purpose for which the facilities were constructed or acquired.

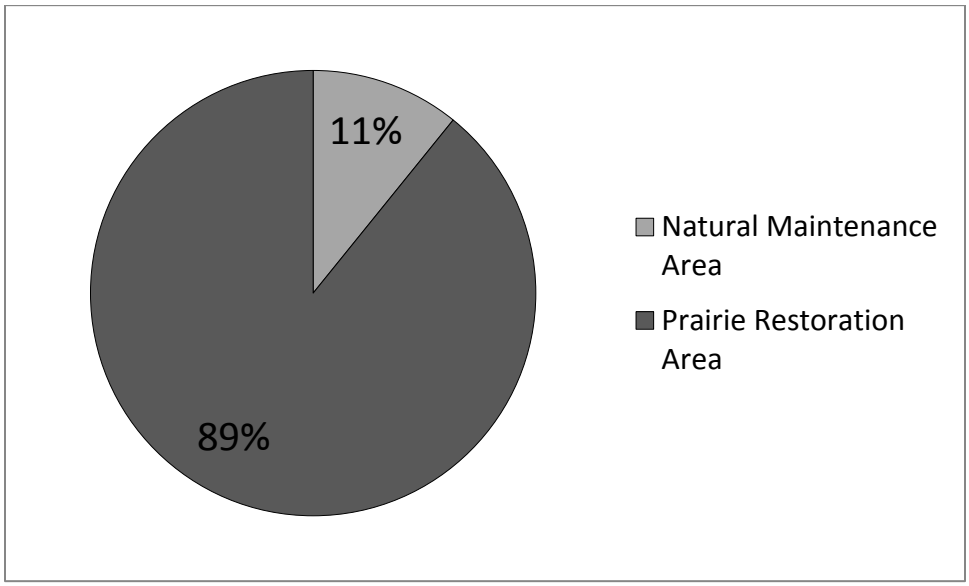
Action Alternative Descriptions

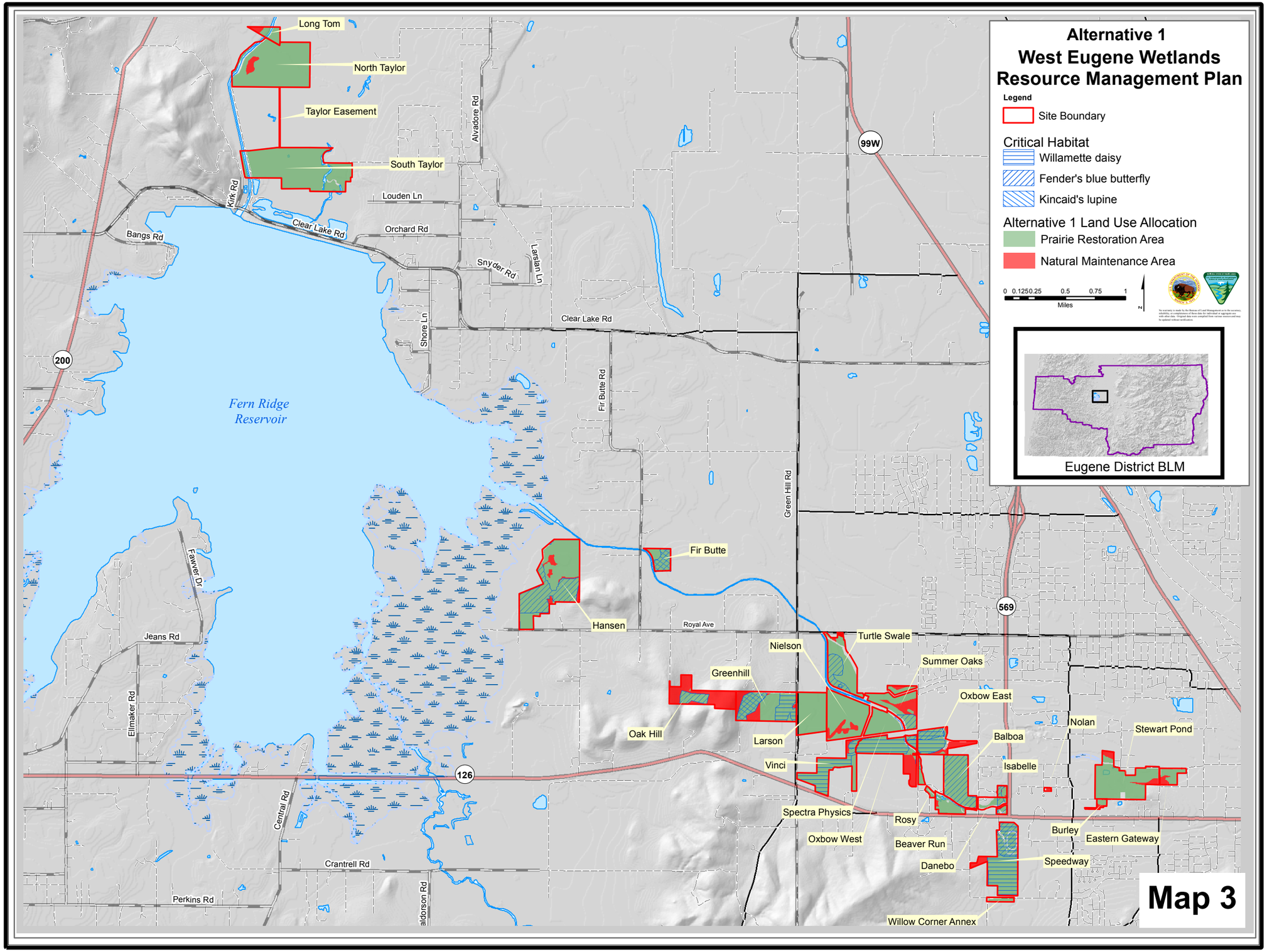
Alternative 1

This alternative would allocate to the Prairie Restoration Area all designated critical habitat and Class 1 and Class 2 sites (BLM 2005). This alternative would also allocate to the Prairie Restoration Area all potential western pond turtle habitat within 300 feet of open water. The Prairie Restoration Area would total 1,137 acres under this alternative, or 89% of the planning area (see Figure 1; Map 3). The remainder of the planning area (11%) would be allocated to the Natural Maintenance Area. Because the Long Tom ACEC would be allocated to the Prairie Restoration Area in this alternative, the ACEC designation for this site would be removed. All of the planning area other than the Fern Ridge Path Special Recreation Management Area would be designated as an Extensive Recreation Management Area.

This alternative would include herbicides among the management tools. The herbicides available for use would be glyphosate, clopyralid, and triclopyr. In addition, aminopyralid and fluazifop would be available for limited use for Research and Demonstration to evaluate the effectiveness of these herbicides to control noxious weeds and invasive non-native plants in the planning area.

Figure 1. Alternative 1 land use allocation acreage




Alternative 1
West Eugene Wetlands
Resource Management Plan
Legend
Site Boundary
Critical Habitat
Willamette daisy
Fender's blue butterfly
Kincaid's lupine
Alternative 1 Land Use Allocation
Prairie Restoration Area
Natural Maintenance Area
0 0.125 0.25 0.5 0.75 1
Miles
N
Eugene District BLM
Map 3
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Greenhill
Oak Hill
Larson
Nielson
Turtle Swale
Summer Oaks
Oxbow East
Balboa
Isabelle
Nolan
Stewart Pond
Vinci
Spectra Physics
Oxbow West
Rosy
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex
Fern Ridge Reservoir
Louden Ln
Orchard Rd
Snyder Rd
Clear Lake Rd
Bangs Rd
Kirk Rd
Alvadore Rd
Larsen Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Royal Ave
Jeans Rd
Fawver Dr
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
aldorson Rd
99W
200
126
569

Land Use Allocations

Prairie Restoration Area

Management Objective

- Restore and maintain habitat for prairie-related species.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Apply herbicides for vegetation control where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control for restoration and maintenance of high quality habitat for prairie-related species. Herbicides may be used for control of noxious weeds, invasive non-native plants and invasive native plants. Use standard operating procedures for herbicide application (see Appendix E).
- Allow collection of traditional use plants subject to restrictions as needed to avoid conflict with restoration and maintenance of high quality habitat for prairie-related species.
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Natural Maintenance Area

Management Objective

- Maintain existing plant and animal habitat and provide opportunities for a variety of goods and services.

Management Direction

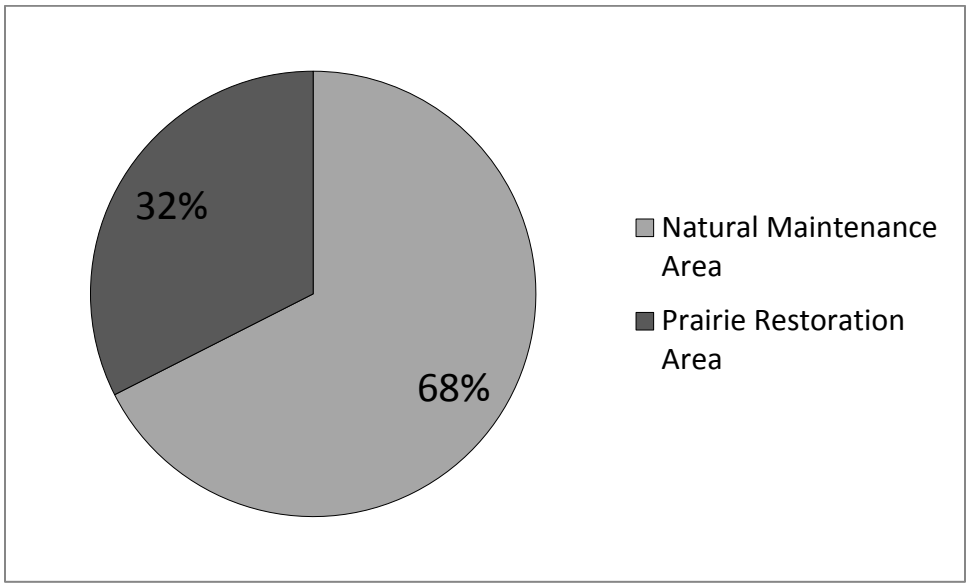
- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to control noxious weeds and invasive native and non-native plant species.
- Apply herbicides for control of noxious weeds where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control to control the spread of noxious weeds. Use standard operating procedures for herbicide application (see Appendix E).
- Manage sites to encourage the availability and accessibility of traditional use to the extent feasible and subject to demand for traditional use plant collection.
- Allow collection of traditional use plants subject to restrictions as needed to avoid resource damage and to provide for the continued availability of traditional use plants.
- Close to saleable mineral exploration, development, and disposal.

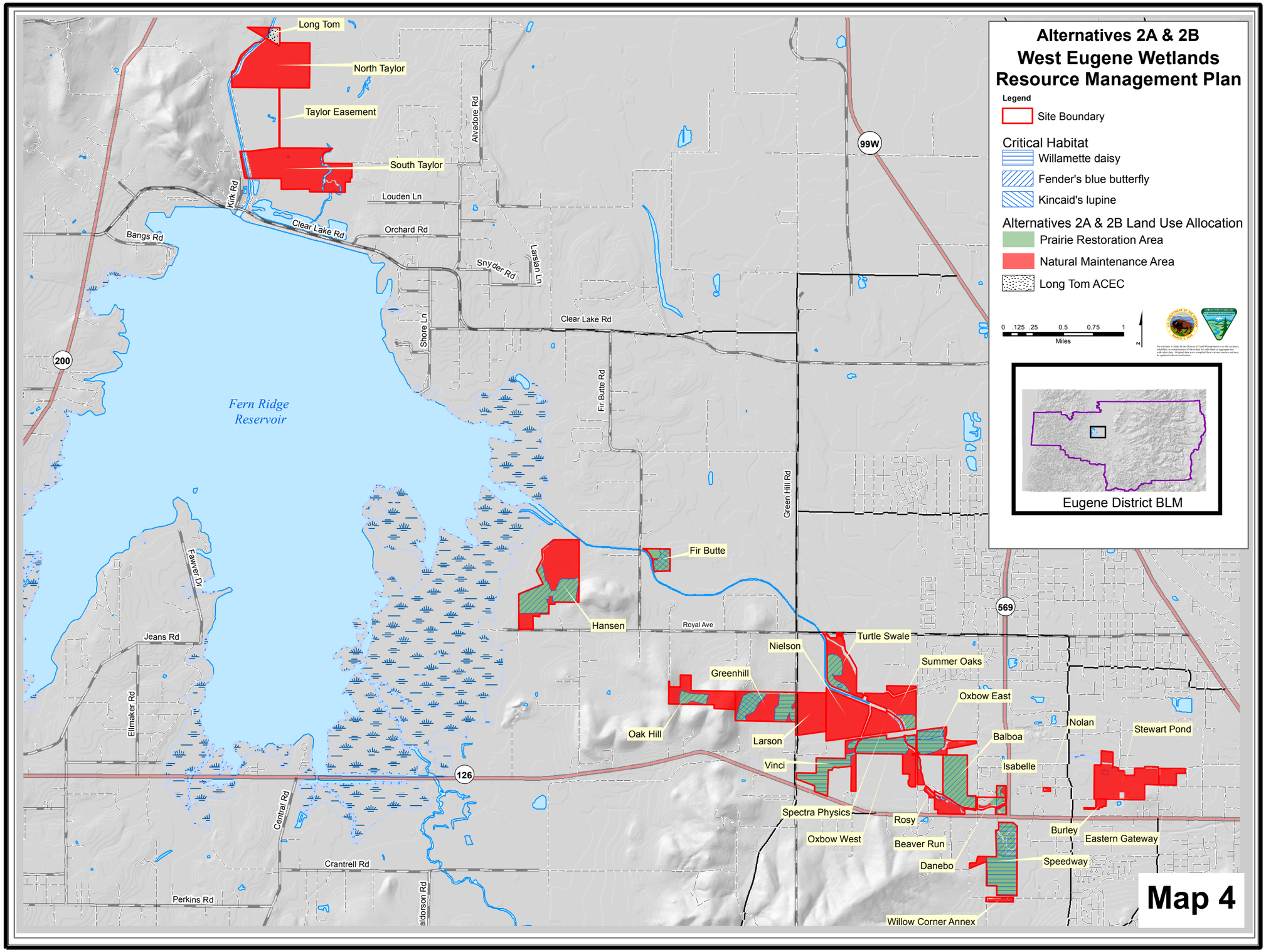
Alternative 2A

This alternative would allocate to the Prairie Restoration Area all designated critical habitat. This alternative would also allocate to the Prairie Restoration Area an area within 300 feet of existing sites of three BLM sensitive moss species: *Bruchia flexuosa, Ephemerum crassinervium*, and *Ephemerum serratum*. The Prairie Restoration Area would total 414 acres under this alternative, or 32% of the planning area (see Figure 2; Map 4). The remainder of the planning area (68%) would be allocated to the Natural Maintenance Area and the Long Tom ACEC, which is seven acres in size. All of the planning area other than the Fern Ridge Path Special Recreation Management Area would be designated as an Extensive Recreation Management Area.

This alternative would include herbicides among the management tools. The herbicides available for use would be glyphosate, clopyralid, and triclopyr. In addition, aminopyralid and fluazifop would be available for limited use for Research and Demonstration to evaluate the effectiveness of these herbicides to control noxious weeds and invasive non-native plants in the planning area.

Figure 2. Alternative 2A land use allocation acreage




Alternatives 2A & 2B
West Eugene Wetlands
Resource Management Plan
Legend
Site Boundary
Critical Habitat
Willamette daisy
Fender's blue butterfly
Kincaid's lupine
Alternatives 2A & 2B Land Use Allocation
Prairie Restoration Area
Natural Maintenance Area
Long Tom ACEC
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Greenhill
Oak Hill
Larson
Nielson
Turtle Swale
Summer Oaks
Oxbow East
Balboa
Isabelle
Nolan
Stewart Pond
Vinci
Spectra Physics
Oxbow West
Rosy
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex
Fern Ridge Reservoir
Alvadore Rd
Louden Ln
Orchard Rd
Snyder Rd
Larsen Ln
Clear Lake Rd
Kirk Rd
Bangs Rd
Shore Ln
Fir Butte Rd
Green Hill Rd
Fawver Dr
Jeans Rd
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
Royal Ave
99W
200
126
569
Map 4

Land Use Allocations

Prairie Restoration Area

Management Objective

- Restore and maintain habitat for prairie-related species.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Apply herbicides for vegetation control where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control for restoration and maintenance of high quality habitat for prairie-related species. Herbicides may be used for control of noxious weeds, invasive non-native plants, and invasive native plants. Use standard operating procedures for herbicide application (see Appendix E).
- Allow collection of traditional use plants subject to restrictions as needed to avoid conflict with restoration and maintenance of high quality habitat for prairie-related species.
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Natural Maintenance Area

Management Objective

- Maintain existing plant and animal habitat and provide opportunities for a variety of goods and services.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to control noxious weeds and invasive native and non-native plant species.
- Apply herbicides for control of noxious weeds where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control to avoid spread of noxious weeds, except in the Stewart Pond and Eastern Gateway sites. Use standard operating procedures for herbicide application (see Appendix E).
- Apply no herbicides in the Stewart Pond and Eastern Gateway sites.

- Manage sites to encourage the availability and accessibility of traditional use to the extent feasible and subject to demand for traditional use plant collection.
- Allow collection of traditional use plants subject to restrictions as needed to avoid resource damage and to provide for the continued availability of traditional use plants.
- Close to saleable mineral exploration, development, and disposal.

Area of Critical Environmental Concern

Management Objective

- Maintain or restore important and relevant values in the Long Tom Area of Environmental Concern.

Management Direction

- Continue to designate the Long Tom Area of Environmental Concern.
- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Apply herbicides for vegetation control where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control for restoration and maintenance of high quality habitat for prairie-related species. Herbicides may be used for control of noxious weeds, invasive non-native plants, and invasive native plants. Use standard operating procedures for herbicide application (see Appendix E).
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Alternative 2B

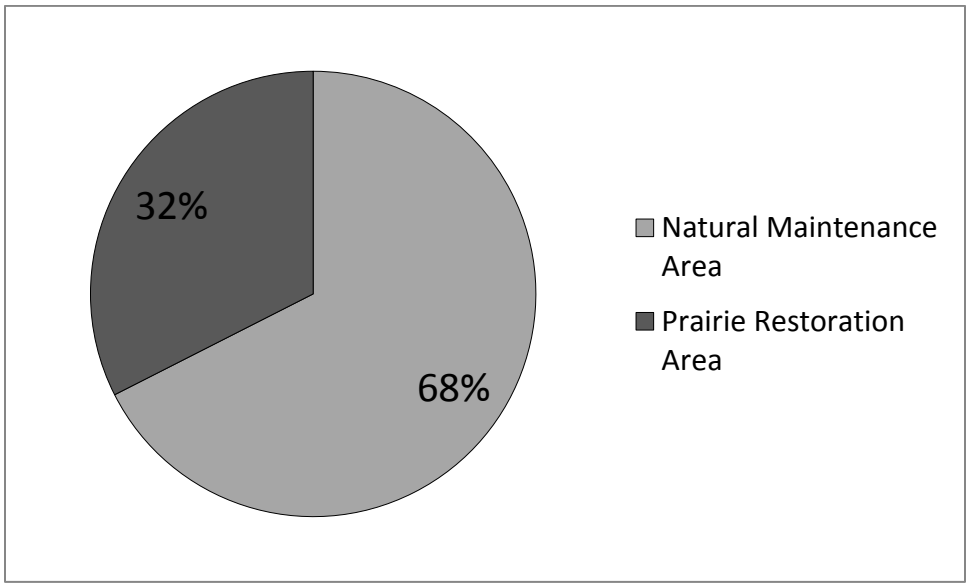
This alternative would emphasize providing commodities and services to the extent compatible with threatened and endangered species management.

Similar to Alternative 2A, this alternative would allocate all designated critical habitat to the Prairie Restoration Area. This alternative would also allocate to the Prairie Restoration Area an area within 300 feet of existing sites of three BLM sensitive moss species: *Bruchia flexuosa, Ephemerum crassinervium*, and *Ephemerum serratum*. The Prairie Restoration Area would total 414 acres under this alternative, or 32% of the planning area (see Figure 3; Map 4). The remainder of the planning area (68%) would be allocated to the Natural Maintenance Area and the Long Tom ACEC, which is seven acres in size. All of the planning area other than the Fern Ridge Path Special Recreation Management Area would be designated as an Extensive Recreation Management Area.

This alternative would include herbicides among the management tools. The herbicides available for use would be glyphosate, clopyralid, and triclopyr. In addition, aminopyralid and fluazifop would be available for limited use for Research and Demonstration to evaluate the effectiveness of these herbicides to control noxious weeds and invasive non-native plants in the planning area.

This alternative, unlike the other actions alternatives, would make the Natural Maintenance Area (854 acres) open to use of saleable minerals, such and sand, clay, and gravel.

Figure 3. Alternative 2B land use allocation acreage



Land Use Allocations

Prairie Restoration Area

Management Objective

- Restore and maintain habitat for prairie-related species.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Apply herbicides for vegetation control where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control for restoration and maintenance of high quality habitat for prairie-related species. Herbicides may be used for control of noxious weeds, invasive non-native plants, and invasive native plants. Use standard operating procedures for herbicide application (see Appendix E).
- Allow collection of traditional use plants subject to restrictions as needed to avoid conflict with restoration and maintenance of high quality habitat for prairie-related species.
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Natural Maintenance Area

Management Objective

- Maintain existing plant and animal habitat and provide opportunities for a variety of goods and services.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to control noxious weeds and invasive native and non-native plant species.
- Apply herbicides for control of noxious weeds where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control to avoid spread of noxious weeds, except in the Stewart Pond and Eastern Gateway sites. Use standard operating procedures for herbicide application (see Appendix E).
- Apply no herbicides in the Stewart Pond and Eastern Gateway sites.

- Allow collection of traditional use plants subject to restrictions as needed to avoid conflict with the provision of other goods and services.
- Make available for saleable mineral exploration, development, and disposal where use is consistent with the protection of other resource values and while attaining other management objectives. Any exploration, development, or disposal of saleable minerals would require bonded reclamation plans and approval of plans of operation to meet RMP objectives.

Area of Critical Environmental Concern

Management Objective

- Maintain or restore important and relevant values in the Long Tom Area of Environmental Concern.

Management Direction

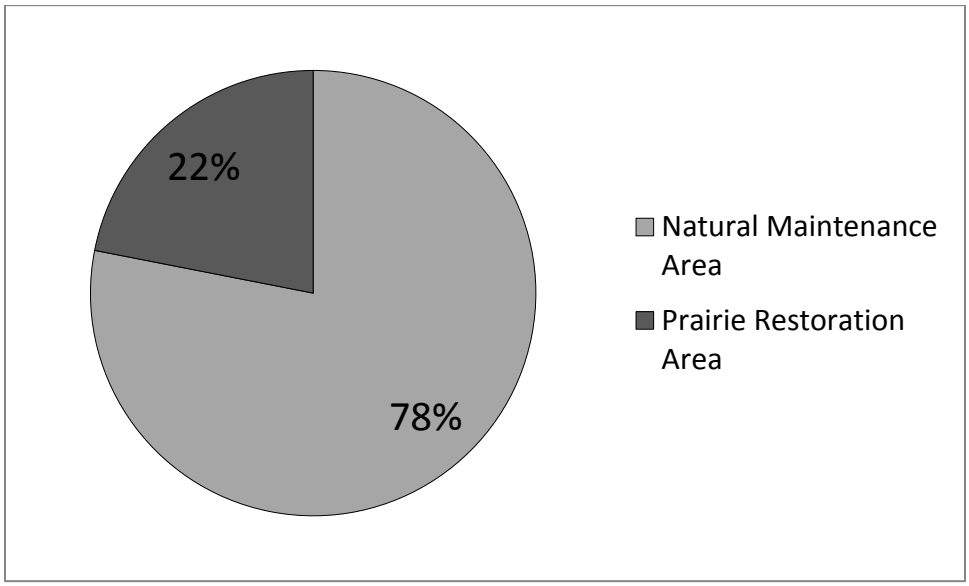
- Continue to designate the Long Tom Area of Environmental Concern.
- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Apply herbicides for vegetation control where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control for restoration and maintenance of high quality habitat for prairie-related species. Herbicides may be used for control of noxious weeds, invasive non-native plants, and invasive native plants. Use standard operating procedures for herbicide application (see Appendix E).
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

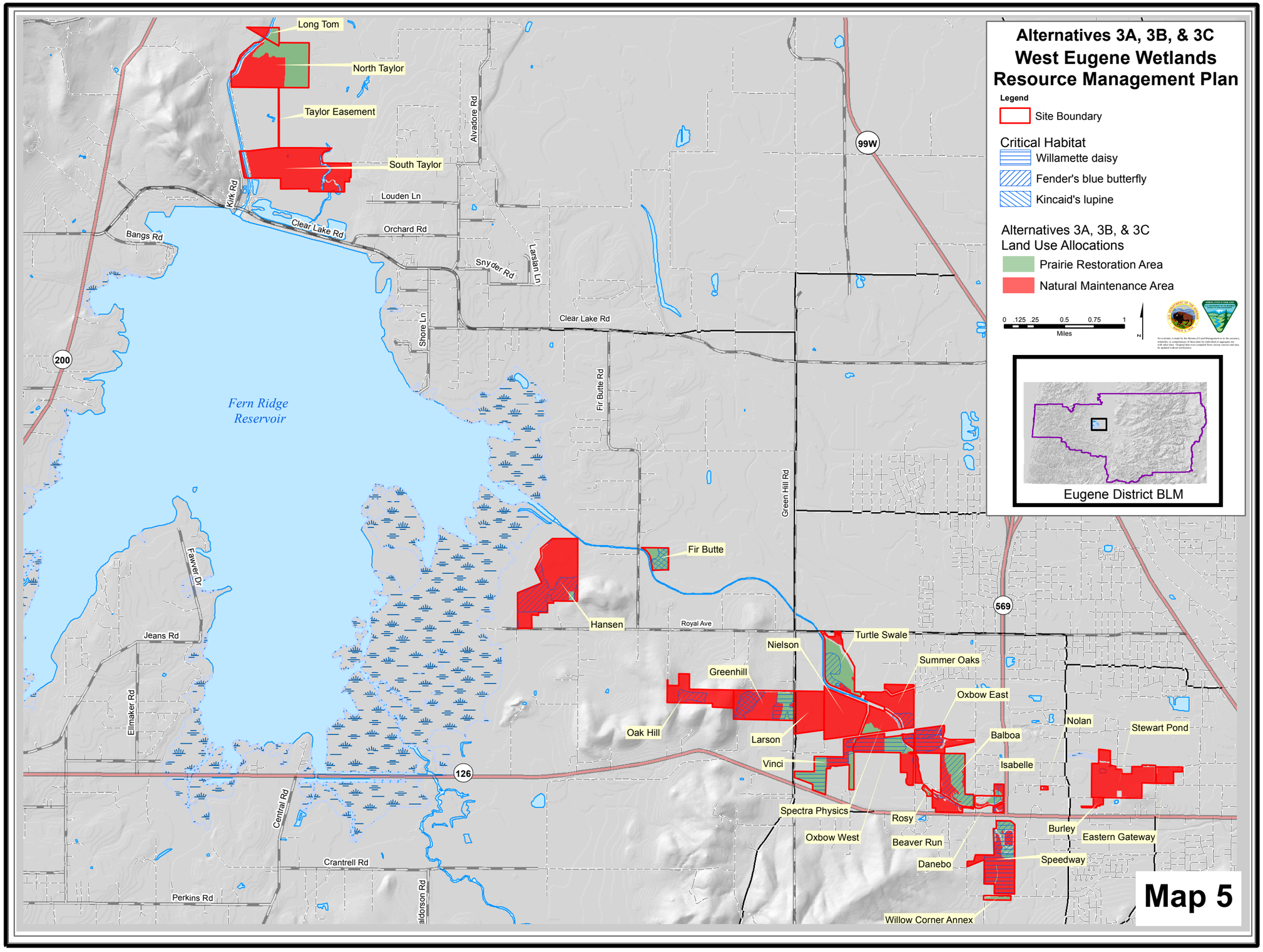
Alternative 3A

This alternative would allocate to the Prairie Restoration Area all Class 1 sites (BLM 2005) that are currently occupied by threatened or endangered species. This alternative would also allocate to the Prairie Restoration Area an area within 300 feet of existing sites of three BLM sensitive moss species: *Bruchia flexuosa, Ephemerum crassinervium*, and *Ephemerum serratum*. The Prairie Restoration Area would total 279 acres under this alternative, or 22% of the planning area (see Figure 4; Map 5). The remainder of the planning area (78%) would be allocated to the Natural Maintenance Area. Because the Long Tom ACEC would be allocated to the Prairie Restoration Area in this alternative, the ACEC designation for this site would be removed. All of the planning area other than the Fern Ridge Path Special Recreation Management Area would be designated as an Extensive Recreation Management Area.

This alternative would include herbicides among the management tools. The herbicides available for use would be glyphosate, clopyralid, and triclopyr. In addition, aminopyralid and fluazifop would be available for limited use for Research and Demonstration to evaluate the effectiveness of these herbicides to control noxious weeds and invasive non-native plants in the planning area.

Figure 4. Alternative 3A land use allocation acreage




Alternatives 3A, 3B, & 3C
West Eugene Wetlands
Resource Management Plan
Legend
Site Boundary
Critical Habitat
Willamette daisy
Fender's blue butterfly
Kincaid's lupine
Alternatives 3A, 3B, & 3C
Land Use Allocations
Prairie Restoration Area
Natural Maintenance Area
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Map 5
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Nielson
Turtle Swale
Summer Oaks
Greenhill
Oxbow East
Oak Hill
Larson
Balboa
Nolan
Stewart Pond
Vinci
Isabelle
Spectra Physics
Rosy
Oxbow West
Beaver Run
Burley
Eastern Gateway
Danebo
Speedway
Willow Corner Annex
Fern Ridge
Reservoir
Bangs Rd
Kirk Rd
Clear Lake Rd
Louden Ln
Orchard Rd
Alvadore Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Royal Ave
Jeans Rd
Fawver Dr
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
aldorson Rd
200
126
99W
569

Land Use Allocations

Prairie Restoration Area

Management Objective

- Restore and maintain habitat for prairie-related species.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Apply herbicides for vegetation control where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control for restoration and maintenance of high quality habitat for prairie-related species. Herbicides may be used for control of noxious weeds, invasive non-native plants, and invasive native plants. Use standard operating procedures for herbicide application (see Appendix E).
- Allow collection of traditional use plants subject to restrictions as needed to avoid conflict with restoration and maintenance of high quality habitat for prairie-related species.
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Natural Maintenance Area

Management Objective

- Maintain existing plant and animal habitat and provide opportunities for a variety of goods and services.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to control noxious weeds and invasive native and non-native plant species.
- Apply herbicides for control of noxious weeds where prescribed burning, manual, mechanical, and other non-chemical vegetation treatments do not provide sufficient vegetation control to avoid spread of noxious weeds, except in the Stewart Pond and Eastern Gateway sites. Use standard operating procedures for herbicide application (see Appendix E).
- Apply no herbicides in the Stewart Pond and Eastern Gateway sites.

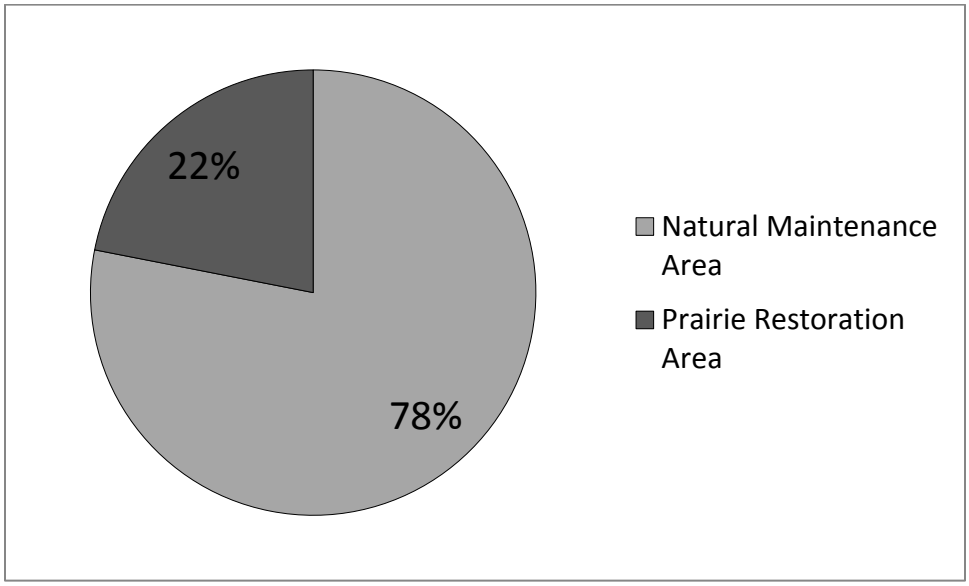
- Manage sites to encourage the availability and accessibility of traditional use to the extent feasible and subject to demand for traditional use plant collection.
- Allow collection of traditional use plants subject to restrictions as needed to avoid resource damage and to provide for the continued availability of traditional use plants.
- Within designated critical habitat, exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Alternative 3B

Similar to Alternative 3A, this alternative would allocate to the Prairie Restoration Area all Class 1 sites (BLM 2005) that are currently occupied by threatened or endangered species. This alternative would also allocate to the Prairie Restoration Area an area within 300 feet of existing sites of three BLM sensitive moss species: *Bruchia flexuosa, Ephemerum crassinervium*, and *Ephemerum serratum*. The Prairie Restoration Area would total 279 acres under this alternative, or 22% of the planning area (see Figure 5; Map 5). The remainder of the planning area (78%) would be allocated to the Natural Maintenance Area. Because the Long Tom ACEC would be allocated to the Prairie Restoration Area in this alternative, the ACEC designation for this site would be removed. All of the planning area other than the Fern Ridge Path Special Recreation Management Area would be designated as an Extensive Recreation Management Area.

No herbicide use would be allowed under this alternative.

Figure 5. Alternative 3B land use allocation acreage



Land Use Allocations

Prairie Restoration Area

Management Objective

- Restore and maintain habitat for prairie-related species.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Allow collection of traditional use plants subject to restrictions as need to avoid conflict with restoration and maintenance of high quality habitat for prairie-related species.
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Natural Maintenance Area

Management Objective

- Maintain existing plant and animal habitat and provide opportunities for a variety of goods and services.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to control noxious weeds and invasive native and non-native plant species.
- Manage sites to encourage the availability and accessibility of traditional use to the extent feasible and subject to demand for traditional use plant collection.
- Allow collection of traditional use plants subject to restrictions as needed to avoid resource damage and to provide for the continued availability of traditional use plants.
- Within designated critical habitat, exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

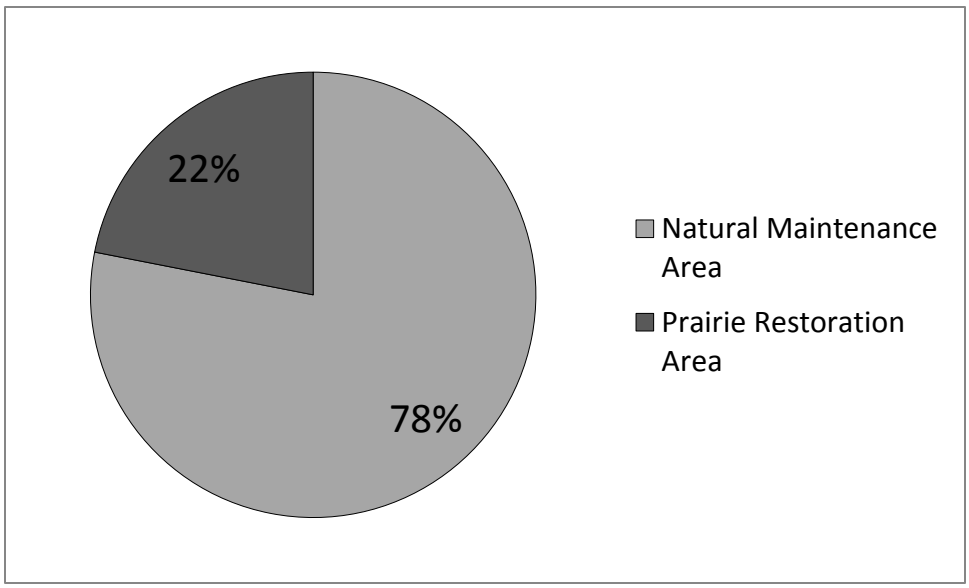
Alternative 3C

This alternative would enhance recreation opportunities to the extent compatible with threatened and endangered species management.

Similar to Alternatives 3A and 3B, this alternative would allocate to the Prairie Restoration Area all Class 1 sites (BLM 2005) that are currently occupied by threatened or endangered species. This alternative would also allocate to the Prairie Restoration Area an area within 300 feet of existing sites of three BLM sensitive moss species: *Bruchia flexuosa, Ephemerum crassinervium*, and *Ephemerum serratum*. The Prairie Restoration Area would total 279 acres under this alternative, or 22% of the planning area (see Figure 6; Map 5). The remainder of the planning area (78%) would be allocated to the Natural Maintenance Area. Because the Long Tom ACEC would be allocated to the Prairie Restoration Area in this alternative, the ACEC designation for this site would be removed. All of the planning area other than the Fern Ridge Path Special Recreation Management Area and the Stewart Pond site would be designated as an Extensive Recreation Management Area.

No herbicide use would be allowed under this alternative.

Figure 6. Alternative 3C land use allocation acreage



Land Use Allocations

Prairie Restoration Area

Management Objective

- Restore and maintain habitat for prairie-related species.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to restore and maintain high quality habitat for prairie-related species.
- Allow collection of traditional use plants subject to restrictions as need to avoid conflict with restoration and maintenance of high quality habitat for prairie-related species.
- Exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Natural Maintenance Area

Management Objective

- Maintain existing plant and animal habitat and provide opportunities for a variety of goods and services.

Management Direction

- Apply vegetation management treatments, including prescribed burning, mowing, and manual control, as needed to control noxious weeds and invasive native and non-native plant species.
- Manage sites to encourage the availability and accessibility of traditional use to the extent feasible and subject to demand for traditional use plant collection.
- Allow collection of traditional use plants subject to restrictions as needed to avoid resource damage and to provide for the continued availability of traditional use plants.
- Within designated critical habitat, exclude new rights-of-way, subject to valid existing rights and with the exception of buried lines in the rights-of-way of existing roads.
- Close to saleable mineral exploration, development, and disposal.

Management Objective

- Increase levels and types of recreation uses that contribute to meeting recreational demand and quality visitor experiences.

Management Direction

- Extend existing trails and construct new trails in the future depending on recreational demand and feasibility.
- Identify existing trails suitable for equestrian use or construct new trails for equestrian use depending on recreational demand and feasibility to the extent compatible with other management objectives.
- Pave the parking area at Stewart Pond.
- Install a concrete vault restroom at the Stewart Pond parking area.
- Construct additional loop trails at Stewart Pond to create routes of various lengths.
- Improve facilities at Stewart Pond, including kiosks, picnic tables, benches, interpretive signs.
- Develop a disc golf course at Stewart Pond (Figure 7).
- Designate the Stewart Pond site as a Special Recreation Management Area for wildlife viewing, hiking, and disc golf.

Figure 7. Alternative 3C disc golf course proposal for Stewart Pond

Comparison of Alternatives

Table 1 summarizes the major features that are not common to all action alternatives. Detailed descriptions of the alternatives, including maps of the land use allocations, are provided earlier in this chapter.

Table 1. Summary of key features of the alternatives

	No Action	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 3C
Prairie Restoration Area	Not applicable	1,137 acres	414 acres		279 acres		
Herbicide use	None	Prairie Restoration Area: for habitat restoration Natural Maintenance Area: for noxious weed control	Prairie Restoration Area: for habitat restoration Natural Maintenance Area: for noxious weed control, except none at Stewart Pond and Eastern Gateway			None	
Long Tom ACEC Designation	Designated	Removed (allocated to Prairie Restoration Area)	Designated		Removed (allocated to Prairie Restoration Area)		
Right-of-Way Exclusion Areas	None	Prairie Restoration Area	Prairie Restoration Area and Long Tom ACEC		Prairie Restoration Area and designated Critical Habitat		
Saleable Minerals	Open	Closed		Closed, except Natural Maintenance Area open	Closed		
Recreation Objectives	Provide existing levels and types of recreation uses						Increase levels and types of recreation uses
Special Recreation Management Areas	Not applicable	Fern Ridge Path					Fern Ridge Path and Stewart Pond

The action alternatives would allocate different areas to the Prairie Restoration Area and would employ different suites of management treatments for habitat restoration. As a result, the average acres of each treatment type would vary by alternative. The acres in Table 2 represent averages across all allocations, based on the location and extent of the land use allocations, management objectives, existing conditions, and available treatments for each alternative. These estimates are not management direction, but represent projections of the likely implementation of each alternative that illustrate the differences among the alternatives.

The estimations below of herbicide use under Alternatives 1, 2A, 2B, and 3A represent estimations of the total acres of sites that would be treated (gross acres), not the actual area that would receive herbicide treatment (net acres). This estimate of gross treatment acres generally overestimates the actual area that would receive herbicide treatment, especially for spot treatments of scattered infestations of target plants. However, it is not possible to estimate accurately the net treatment acres, which would vary widely with different herbicide application methods and different amounts of target plant infestation.

Table 2. Management treatments by alternative; all allocations; average acres per year

	No Action	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 3C
mowing	226	179	146	146	228	283	283
burning	190	260	94	94	83	84	84
herbicide	0	590	289	289	113	0	0
thinning	32	29	2	2	7	7	7

Table 3 provides a summary of the key impacts of the alternatives. This table focuses on effects that vary substantially among the alternatives. Detailed analysis of the environmental consequences of the alternatives is provided in Chapter 4.

Table 3. Summary of key effects of the alternatives

		No Action	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 3C
High quality prairie and savanna (acres)		0	1,137	420	420	279	0	0
Achieve recovery targets for five threatened and endangered plants?		No	Yes	Yes	Yes	Yes	No	No
Achieve recovery targets for Fender's blue butterfly?		No	Yes	Yes	Yes	No	No	No
Would sensitive plant sites be within high quality prairie or savanna habitat?		None	All	Some	Some	Some	None	None
Particulate emissions from prescribed burning (tons per year)	PM_{10}	6.4	17.6	1.7	1.7	5.0	5.0	5.0
	$PM_{2.5}$	5.5	14.9	1.5	1.5	4.2	4.3	4.3
Greenhouse gas emissions CO_2 equivalent (tonnes per year)		14,000	24,000	6,000	6,000	7,000	7,000	7,000
Recreation opportunities		No change	No change	No change	No change	No change	No change	Increase
Annual cost of implementation (dollars)		532,000	606,000	460,000	460,000	445,000	445,000	451,000[2]

[2] Alternative 3C would also include $90,000 in one-time costs.

Preferred Alternative

Alternative 2A is the BLM preferred alternative. In identifying the BLM preferred alternative, the BLM evaluated how well the alternatives would respond to the purpose and need for action and the effects of the alternatives relevant to the issues identified for detailed analysis. The identification of the preferred alternative does not constitute a commitment or decision in principle. Based on the analysis in this EIS, the BLM is unlikely to present Alternative 2A unchanged as the proposed RMP in the proposed RMP/final EIS. Instead, the BLM is simply identifying that, based on the analysis in this Draft RMP/Draft EIS, the BLM believes that Alternative 2A would provide the best starting point from which to construct a proposed RMP. In developing a proposed RMP, the BLM would consider making modifications to the preferred alternative in response to public comments on the Draft RMP/Draft EIS and advice from cooperating agencies. Such modifications might include, for example, adding the recreation objectives and management direction from Alternative 3C; adding to the Prairie Restoration Area sites with existing populations of threatened, endangered, or sensitive plants; and dropping from the Prairie Restoration Area poor quality sites that do not contribute to meeting recovery targets.

Alternatives Considered but not Analyzed in Detail

An environmental impact statement must rigorously explore and objectively evaluate all reasonable alternatives. The range of alternatives is limited by the requirement to fulfill the purpose and need, which is the reason or reasons for the agencies to be proposing action. See Chapter 1 for the purpose and need. Alternatives that are not reasonable are eliminated from detailed study. An alternative need not be considered if:

- it does not meet the purpose and need;
- it is technically or economically infeasible;
- it is inconsistent with the basic policy objectives for the management of the area;
- its implementation is remote or speculative;
- it is substantially similar to an alternative being considered in detail; or
- it would have substantially similar effects to an alternative being considered in detail.

The following alternatives were considered by the interdisciplinary team, but not analyzed in detail.

Provide No Active Management

An alternative that would provide no active management or minimize active management of the planning area would not respond to the purpose and need for action, because it would not contribute to the recovery of threatened and endangered species. An alternative of taking no management actions to maintain, enhance, or expand any of the habitats found in the planning area was analyzed in the 2005 Schedule EA. That alternative would have taken only those actions specifically required by City or County ordinance, or other law or policy, such as weed mowing and fire suppression. The analysis in the 2005 Schedule EA found that habitat for many species, including the threatened and endangered species, would not be maintained, enhanced, or expanded under this alternative (BLM 2005, pp. 28-42). That analysis is incorporated here by reference.

Restore high quality habitat for threatened and endangered species on the entire planning area

An alternative that would implement prairie and savanna restoration on the entire planning area was considered, but eliminated from detailed analysis because it would not be feasible. Many of the sites identified as low quality sites in the 2005 Schedule EA do not have the potential to be restored to habitat for threatened and endangered species, including many sites that have physical or biological characteristics that would preclude habitat development for threatened and endangered species. As a result, the effects of an alternative that would attempt to restore threatened and endangered species habitat on all of the planning area would have substantially the same effects on threatened and endangered species as Alternative 1, which is analyzed in detail.

Acquire additional lands for habitat management

An alternative that would include additional planned land acquisition boundary by the BLM within the planning area would be beyond the scope of the action, and thus would inconsistent with the basic policy objectives for the management of the area. As directed by the State Director guidance presented in the Proposed Planning Criteria and State Director Guidance, further planned land acquisition by the BLM in the planning area is beyond the scope of the RMP. The BLM has completed an extensive program of land acquisition in the planning area over the past decades. Although there might be additional unplanned land acquisition by the BLM in the future, such as through donation, the BLM has already completed the planned land acquisition within the planning area boundary.

Withdraw the entire planning area from mining

As described in the Affected Environment, most of the planning area is currently withdrawn from locatable mineral entry, and the potential for the occurrence of locatable minerals throughout the planning area is low. Only Stewart Pond, Eastern Gateway, Long Tom, and the thin strip connecting North Taylor and South Taylor are open to locatable mineral entry. Because of the very small acreage that is currently not withdrawn and the low potential for occurrence of locatable minerals, exploration and development of locatable minerals in the planning area is not reasonably foreseeable. Therefore, the effect of an alternative that would withdraw those few remaining sites from mineral entry would be substantially similar to the alternatives that are analyzed in detail.

Chapter 3 - Affected Environment

Introduction

This chapter describes the affected environment, which presents the existing condition of the resources related to the issues identified for detailed analysis. The presentation of the affected environment is organized by the issues, as is the analysis of environmental consequences.

The description of the affected environment is structured to support the understanding of the analysis of environmental consequences presented in Chapter 4. The amount of information in this chapter is proportionate to the importance, scope, and sensitivity of the environmental consequences and is no longer than necessary to understand the analysis of environmental consequences. Several resources that are not addressed in detail in this section are identified or described in Chapter 1 under Issues Considered but not Analyzed in Detail.

The geographic scope of the analyses varies by issue, as described for each issue. For example, the analysis of effects on threatened and endangered species has a geographic scope of the recovery zone for each species. The analyses reference the planning area, which is the BLM-administered lands within which this RMP will make a decision. Some analyses also reference the planning area boundary, which is the broader geographic area surrounding the planning area, including all land ownerships (see Map 1).

The issues analyzed in detail are:

- How would BLM management actions affect the restoration of native plant communities?
- How would BLM management actions contribute to meeting the recovery objectives described in the recovery plan for ESA-listed species?
- How would BLM management actions affect BLM sensitive and strategic plant and animal species?
- How would herbicide use affect soil, water, plants, and animals?
- How would prescribed burning affect air quality?
- How would changing climate conditions alter the effect of BLM management actions on resources?
- How would BLM management actions affect greenhouse gas emissions and carbon storage?
- How would BLM management actions affect archaeological, historical and traditional use resources (trust responsibilities)?
- How would BLM management actions affect access to the planning area, authorizations over the planning area, and authorizations for extractive uses in the planning area?
- How would BLM management actions affect recreation opportunities?
- How much would it cost to implement the alternatives?

How would BLM management actions affect the restoration of native plant communities?

Key Points
• The planning area is currently dominated by low quality wet prairie, ash swale/riparian, low quality upland prairie, and oak woodland. • No sites in the planning area currently meet recovery targets for prairie quality and diversity.

The planning area is within the southern Willamette Valley Physiographic Province. The geology, soils, hydrology and the ecology of the planning area have been summarized in the Schedule EA, which describes the planning area as characterized by upland and wet prairies and oak woodland and savanna habitats, with finer scale features, such as vernal pools, emergent wetlands and ash swales (BLM 2005, pp. 13-18, 72). That analysis is incorporated here by reference. Wet and upland prairies were historically maintained by frequent anthropogenic burning that precluded the successional development into forested landscapes. While upland prairies are well-drained, wet prairies are maintained when surface clay holds winter rains remaining into the spring and drying out in summer. The plant communities in the West Eugene Wetlands are globally unique and support conditions for several endemic plant and animal species which are described under the issues related to threatened and endangered species and sensitive and strategic species.

Plant Community Classification

Descriptions of the plant communities of the planning area are provided in the Schedule EA (BLM 2005, pp. 19-22) and are incorporated here by reference. The mapping of plant communities of the planning area has been updated since the preparation of the Schedule EA, and the grouping of plant communities has been slightly modified: emergent wetlands and wet prairie are combined for most analyses (though are considered separately for the analysis of sensitive and strategic animal species), and oak woodland and oak savanna are considered separately in this analysis. Additionally, this analysis distinguishes high quality wet prairie, upland prairie, and oak savanna from low quality wet prairie, upland prairie, and oak savanna.[3] High quality habitat wet prairie, upland prairie, and oak savanna are sites that meet all of the "prairie quality and diversity" guidelines necessary for recovery of plant and animal species, as identified in the Recovery Plan (USFWS 2010, pp. 73, D-1 – D-2) and presented in Table 4.[4] Those descriptions are incorporated here by reference.

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[3] Note that the site classifications in BLM 2005 of Class 1/Class 2/Class 3 are relative classifications of the current habitat condition that do not equate to this plant community classification of high quality prairie or savanna habitat. Although Class 1 sites represent the best current habitat within the planning area, they do not equate to high quality prairie or savanna habitat, as defined in Table 4.

[4] This plant community classification of high quality prairie or savanna habitat does not equate to the performance criteria for wetland mitigation bank credits, described in U.S. Army Corps of Engineers et al., 1995, pp. 8-9. The

Table 4. Summary of plant community recovery targets

Cover of Native Vegetation	Sites with populations of target species should have relative cover of natives of 50% or more
Cover of woody vegetation	Woody vegetation should make up no more than 15% of the absolute vegetative cover with woody species of management concern no greater than 5% (unless the site is savanna habitat with an upper limit of 25% woody vegetation)
Prairie diversity	For each population site, native prairie species richness must exceed 10 species (measure in 24 m^2 plots), of which 7 species or more are forbs and one bunch grass
Non-native vegetation	No single non-native plant will have more than 50% cover. Non-natives of particular concern (listed in the Recovery Plan) will have no greater than 5 percent cover.
Nectar flower abundance and diversity	Flowers that provide nectar for Fender's blue butterfly (20 mg nectar sugar/m^2 of habitat) (listed in the Recovery Plan)
Lupine host plant abundance	Sites that provide breeding habitat for Fender's blue butterfly should have a minimum of 30 lupine leaves/m^2 of habitat
Nectar plant availability	Nectar plants should be available at the habitat patch throughout the entire flight season of the pollinator species (March through September of each year) to ensure continued viability of the pollinators and the species they pollinate

Current Plant Community Condition

The planning area is currently dominated by low quality wet prairie, ash swale/riparian, low quality upland prairie, and oak woodland (see Table 5, Map 6). There are currently no acres in the planning area of high quality wet prairie, high quality upland prairie, or high quality oak savanna, even on sites that currently support populations of threatened and endangered plants or Fender's blue butterfly.

Plant communities on other ownerships within the planning area boundary include many of the same plant communities as on the BLM-administered lands. The primary land owners within the planning area boundary that support native plant communities are West Eugene Wetland partners: the City of Eugene, The Nature Conservancy, and the U.S. Army Corps of Engineers. Within the planning area boundary, the only high quality prairie or savanna habitat currently is 63 acres of wet prairie and 3 acres of upland prairie on City of Eugene land at Coyote Prairie, in the southwest of the planning area boundary.

performance criteria include some, but not all of the targets identified in the Recovery Plan and described in Table 4.

Table 5. Current plant community condition within the planning area boundary

Plant community	acres				
	BLM	City of Eugene	The Nature Conservancy	U.S. Army Corps of Engineers	Total**
high quality wet prairie	0	63	0	0	63
low quality wet prairie	834	424	149	1,322	2,729
high quality upland prairie	0	3	0	0	3
low quality upland prairie	116	0	104	148	368
high quality oak savanna	0	0	0	0	0
low quality oak savanna	23	0	12	0	35
oak woodland	120	0	61	378	559
ash swale/riparian	173	150	142	119	584
plantation	9	0	0	0	9
Douglas-fir forest	<1	0	33	44	78
other*	66	no data	no data	no data	66

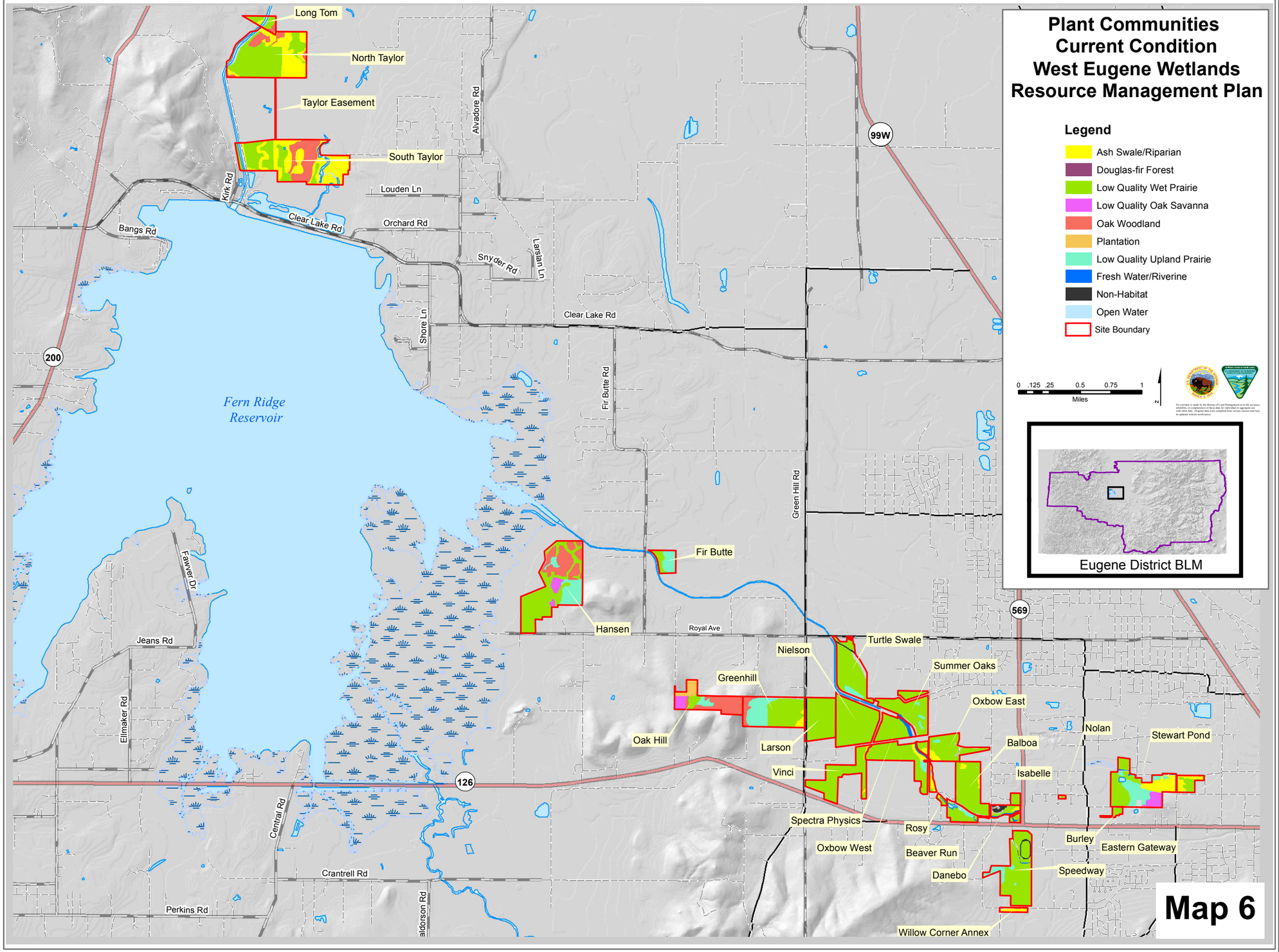
*open water, freshwater/riverine, or developed areas

** totals are incomplete and include only data from these four landowners. The BLM does not have data on plant community conditions on other lands within the planning area boundary.

The current condition of wet prairies, upland prairie, and oak savanna (the plant communities that potentially support threatened and endangered plant species) on BLM-administered lands and on West Eugene Wetland partner lands has been summarized in the Final Action Plan, Working to recover four prairie species in the wetlands: Fenders Blue Butterfly, Kincaid's Lupine, Willamette Daisy, and Bradshaw's Lomatium (West Eugene Wetlands Action Plan) (City of Eugene et al. 2012, pp. 9, 23, 44, 54). Although many of these sites have been actively managed for over a decade, most remain in poor to fair condition with the occurrence of noxious weeds, infestations of non-native grasses and forbs, and the encroachment of native woody vegetation. Those descriptions are incorporated here by reference.

There is likely some smaller acreage of native plant communities on other ownerships within the planning area boundary. Given the absence of long-term management for habitat restoration on these other ownerships, there is no reasonably foreseeable potential for the future development of high quality wet prairie, high quality upland prairie, or high quality oak savanna on ownerships other than the West Eugene Wetlands partners.

Plant Communities Current Condition West Eugene Wetlands Resource Management Plan



How would BLM management actions contribute to meeting the recovery objectives described in the recovery plan for ESA-listed species?

Key Points
• Four listed species are present in the planning area: Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and Fender's blue butterfly. The planning area is thought to be within the historical range of another listed species, golden paintbrush, but there are no current populations in the planning area. • The current populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the Eugene West Recovery Zone meet recovery targets for plant abundance, but not distribution. • Current habitat for Fender's blue butterfly in the planning area does not meet the recovery targets for habitat quality or connectivity.

Threatened and Endangered Plants

Three plant species present in the planning area are listed under the Endangered Species Act: Willamette daisy (*Erigeron decumbens* var. *decumbens*), Bradshaw's lomatium (*Lomatium bradshawii*), and Kincaid's lupine (*Lupinus oreganus* var. *kincaidii*). The planning area may be within the historical range of golden paintbrush (*Castilleja levisecta*), which is also listed under the Endangered Species Act, but there are no known historical or current sites in the planning area.[5]

The Recovery Plan describes in detail the listing status and critical habitat, population trends and distribution, life history and ecology, habitat characteristics, threats/reasons for listing, and conservation measures for the four listed plant species. Those descriptions are summarized below for each species. The Recovery Plan concludes that the West Eugene Wetlands have some of the best remaining populations of rare vascular plant species found in wetland prairies within the Willamette Valley physiographic province of western Oregon, which are essential to recovery efforts. Those discussions in the Recovery Plan are incorporated here by reference (USFWS 2010, pp. II-1 – II-26; II-32 – II-36).

Willamette daisy is an herbaceous perennial that is listed as endangered. It is endemic to the Willamette Valley of western Oregon. Critical habitat has been designated by the U.S. Fish and Wildlife Service and includes portions of the planning area. The primary constituent element of critical habitat is early seral upland prairie, wet prairie, or oak savanna habitat with a mosaic of low-growing grasses, forbs, and spaces to establish seedlings or new vegetative growth; an absence of dense canopy

[5] There is a new introduction site of golden paintbrush on U.S. Army Corps of Engineers land within the planning area boundary, but plant establishment has not been confirmed at this time.

vegetation; and undisturbed subsoils. Although Willamette daisy is found in a variety of wetland and upland habitat throughout its range, all existing sites of Willamette daisy in the planning area are in wet prairie habitats. Threats to this species include habitat loss due to urban and agricultural development, successional encroachment into its habitat by trees and shrubs, competition with non-native weeds, and small population sizes.

Bradshaw's lomatium is an herbaceous perennial that is listed as endangered. It is found from Lane County, Oregon, to southwestern Washington. Critical habitat has not been designated by the U.S. Fish and Wildlife Service for this species. Bradshaw's lomatium is restricted to wet prairie habitats. Threats to this species include expanding urban development, pesticides, encroachment of woody and invasive species, herbivory and grazing.

Kincaid's lupine is an herbaceous perennial that is listed as threatened. It is found from Douglas County, Oregon, to southwestern Washington. Critical habitat has been designated by the U.S. Fish and Wildlife Service and includes portions of the planning area. The primary constituent elements of critical habitat are: (1) early seral upland prairie or oak savanna habitat with a mosaic of low-growing grasses and forbs and spaces to establish seedlings or new vegetative growth, an absence of dense canopy vegetation, and undisturbed subsoils; and (2) the presence of insect outcrossing pollinators with unrestricted movement between existing lupine patches. Threats to this species include habitat loss, competition from non-native plants and elimination of historical disturbance regimes.

Golden paintbrush is an herbaceous perennial that is listed as threatened. The Recovery Plan describes its historical range as extending from the Willamette Valley of Oregon to British Columbia. This species was extirpated from Oregon, but new populations are being reintroduced. Critical habitat has not been designated by the U.S. Fish and Wildlife Service for this species. Based on extant populations in British Columbia and Washington, the Recovery Plan assumes that upland prairie is habitat for this species. Threats to this species include habitat modification as succession changes prairies and grasslands to shrub and forest lands; development for commercial, residential, and agricultural use; low potential for expansion of populations and their refugia because existing habitat is constricted; recreational picking; and herbivory.

The Recovery Plan identifies five recovery targets for the listed plants:

- abundance and distribution
- population trend and evidence of reproduction
- habitat quality and management
- storage of genetic material
- post-delisting monitoring.

Those discussions are incorporated here by reference (USFWS 2010, pp. IV-20 – IV-26; IV-35 – IV-39). Storage of genetic material and post-delisting monitoring are beyond the scope of this RMP. Habitat quality is addressed in the issue above related to plant communities. For Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine, the Recovery Plan identifies recovery targets for abundance and distribution by recovery zone: the planning area lies within the Eugene West Recovery Zone.

The geographic scope for this analysis is the Eugene West Recovery Zone, because that is the area for which the U.S. Fish and Wildlife Service has established recovery targets. The temporal scope of this analysis addresses both short-term (4 years) and the long-term (15 years) effects. The short-term temporal scope reflects the immediate effects of plant augmentation on plant populations. The long-term effects reflect the duration over which the U.S. Fish and Wildlife Service has set recovery targets for population trends for several of the listed plant species.

For abundance, the Recovery Plan sets a target of 15,000 plants of Willamette daisy; 15,000 plants of Bradshaw's lomatium; and 7,500 square meters of cover of Kincaid's lupine[6] in the Eugene West Recovery Zone. For golden paintbrush, the Recovery Plan does not establish a target for abundance specific to the Eugene West Recovery Zone, but sets a total recovery target of 5,000 plants in all recovery zones (Table 6).

For distribution, the Recovery Plan sets targets for multiple populations within each recovery zone. For Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the Eugene West Recovery Zone, the Recovery Plan sets a target of at least three large populations, each within 2 miles of each other. For Willamette daisy and Bradshaw's lomatium, each large population must be at least 2,000 individuals. The Recovery Plan does not set a cover threshold for large populations of Kincaid's lupine. For golden paintbrush, the Recovery Plan does not establish a target for populations specific to the Eugene West Recovery Zone, but identifies a total recovery target of five populations of at least 1,000 individuals each distributed among at least three of the recovery zones (Table 6). Therefore, this analysis will consider that the establishment of one population of at least 1,000 individuals of golden paintbrush would meet the recovery target for distribution in the Eugene West Recovery Zone.

Table 6. Recovery targets for abundance and distribution within Eugene West Recovery Zone by species (USFWS 2010)

species	abundance	distribution
Willamette daisy	15,000 plants	three populations within two miles; each of at least 2,000 individuals
Bradshaw's lomatium	15,000 plants	three populations within two miles; each of at least 2,000 individuals
Kincaid's lupine	7,500 m^2	three populations within two miles
golden paintbrush	1,000 plants	one population

[6] Abundance of Kincaid's lupine is commonly measured in square meters of plant cover, rather than number of plants, because of the difficulty in distinguishing individual plants (USFWS 2008, p. 22).

Although the Recovery Plan establishes a threshold distance of two miles between large populations, the Recovery Plan more generally describes that sufficient connectivity must be achieved among the constituent subpopulations to ensure adequate gene flow and prevent the problems associated with the isolation of small populations (USFWS 2010, p. IV-28). The Recovery Plan explains that gene flow for these species is provided by pollinator movement and additional research is needed to identify the main pollinators for the listed plant species. Based on conversations with the U.S. Fish and Wildlife Service and other experts, a threshold distance of 200 feet would be a more useful measure of connectivity among populations of these plant species (T. Kaye, Institute for Applied Ecology, *personal communication*, February 14, 2011; S. Friedman, USFWS*, personal communication*, February 15, 2011). This finer-scale connectivity would reflect a distance that supports frequent and consistent pollinator movement among plant patches. Although this finer-scale connectivity is not identified as a specific recovery target in the Recovery Plan, greater connectivity among plant patches of these listed plant species would better achieve the general recovery objectives of ensuring adequate gene flow among subpopulations and developing a functional pollinator network in the recovery zone. This fine-scale connectivity of habitat is addressed directly in the issue related to plant communities.

For population trend, the Recovery Plan sets a target of stable or increasing populations over a period of at least 15 years for Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine. The Recovery Plan acknowledges that populations may exhibit year-to-year variability, but the population trend must not be declining. For golden paintbrush, the Recovery Plan sets a target of maintaining a five-year running average population size of at least 1,000 individuals.

The Recovery Plan identifies over 90 existing sites of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine within the Eugene West Recovery Zone. Of those 90 sites, 35 sites within the planning area boundary are considered in the Recovery Plan to be managed and protected sites. Those protected sites are managed by West Eugene Wetlands partners: the BLM, the U.S. Army Corps of Engineers (W. Messinger, U.S. Army Corps of Engineers, *personal communication*, May 13, 2012, May 14, 2012), the City of Eugene (T. Taylor, City of Eugene, *personal communication*, May 15, 2012), and The Nature Conservancy (M. Benotsch, The Nature Conservancy, *personal communication*, May 15, 2012, May 17, 2012) (Table 7). The West Eugene Wetlands Action Plan also describes existing populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine on West Eugene Wetlands partner lands (City of Eugene et al. 2012, pp. 17-22, 36-41, 52-57).

Table 7. Current populations of threatened and endangered plant species on managed and protected sites within the planning area boundary

Land ownership	Willamette daisy (# of plants)	Bradshaw's lomatium (# of plants)	Kincaid's lupine (m^2)
BLM	7,207	2,600	2,540
U.S. Army Corps of Engineers	8,517	41,900	629
City of Eugene	1	59,282*	530
The Nature Conservancy	1,350	31,000	5,000
Total	**17,075**	**134,782**	**8,699**

*includes approximately 57,900 individuals in the Amazon Park site, which is outside of the planning area boundary, but within the Eugene West Recovery Zone

The current abundance of approximately 17,000 plants of Willamette daisy exceeds the recovery target for plant abundance of 15,000 plants in the Eugene West Recovery Zone. For Willamette daisy, there are currently three large populations in the Eugene West Recovery Zone: (1) the BLM Speedway and The Nature Conservancy Willow Creek sites; (2) the BLM Oxbow West and associated BLM sites; and (3) the U.S. Army Corps of Engineers Fischer Butte sites. These three populations satisfy the recovery target of at least three populations of at least 2,000 individuals within two miles of each other.

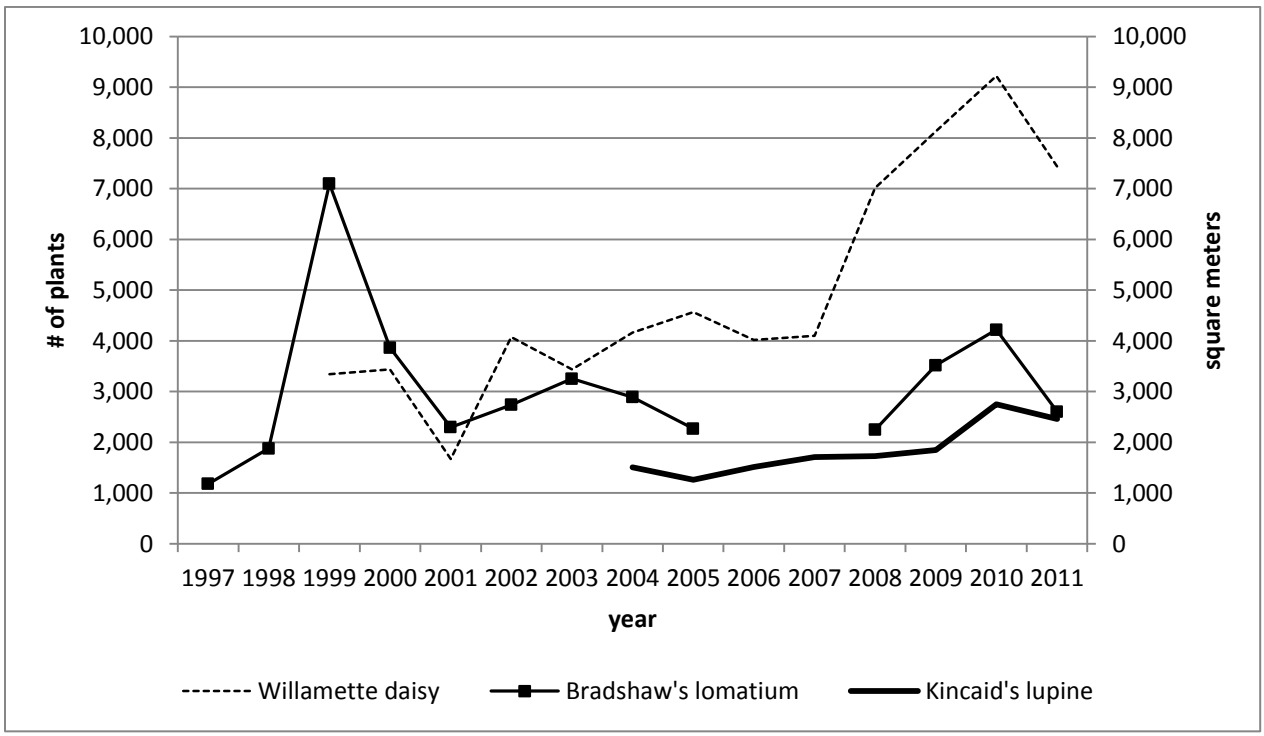
The current abundance of approximately 135,000 plants of Bradshaw's lomatium far exceeds the recovery target for plant abundance of 15,000 plants in the Eugene West Recovery Zone. For Bradshaw's lomatium, there are currently five large populations in the Eugene West Recovery Zone: (1) the City of Eugene Amazon Park site (which is outside of the planning area boundary); (2) the BLM Speedway and The Nature Conservancy Willow Creek sites; (3) the U.S. Army Corps of Engineers Fischer Butte sites; (4) the U.S. Army Corps of Engineers Fern Ridge sites; and (5) the BLM North Taylor and Long Tom sites. The City of Eugene has a small population at Coyote Prairie, which is the only site within the planning area boundary that is currently high quality wet prairie habitat. However, the current population of Bradshaw's lomatium at Coyote Prairie is only 30 plants (D. Steeck, City of Eugene, *personal* communication, August 9, 2012). The City of Eugene Amazon Park site; the BLM Speedway and The Nature Conservancy Willow Creek sites; and the BLM North Taylor and Long Tom sites are not within two miles of another large population. The U.S. Army Corps of Engineers Fischer Butte and Fern Ridge sites are within two miles of each other. The Fern Ridge sites include multiple sites with more than 2,000 individuals. If the Fern Ridge sites are considered one large population, the current populations do not satisfy the recovery target of at least three populations of at least 2,000 individuals within 2 miles of each other. If these sites at Fern Ridge are considered as two or more separate populations, the current populations would satisfy the recovery target of at least three populations of at least 2,000 individuals within 2 miles of each other.

The current abundance of approximately 9,000 square meters of plant cover of Kincaid's lupine exceeds the recovery target for plant abundance of 7,500 square meters in the Eugene West Recovery Zone. For

Kincaid's lupine, there are currently two large populations in the Eugene West Recovery Zone: (1) The Nature Conservancy Willow Creek site; and (2) the BLM Fir Butte site and U.S. Army Corps of Engineers Fern Ridge sites. The Recovery Plan presents a minimum population size for the listed plants only in terms of number of plants, not area of plant cover. Thus, it is not possible to compare directly the current populations in the Eugene West Recovery Zone to the recovery target for populations. Nevertheless, there are currently only two large populations, and they are not within 2 miles of each other. Therefore, at least one additional large population of Kincaid's lupine would be needed to meet the recovery target for populations in the Eugene West Recovery Zone.

Populations of Willamette daisy, Bradshaw's lomatium and Kincaid's lupine in the planning area have fluctuated over time, but do not exhibit consistent or strong trends in abundance (Figure 8). Populations of Willamette daisy and Kincaid's lupine have shown a general increase, but the short time extent of survey information and the gaps in survey information limit the ability to interpret population trends.

Figure 8. Populations of threatened and endangered plant species in the planning area over time (Willamette daisy and Bradshaw's lomatium in # of plants; Kincaid's lupine in square meters)



The following sites within the planning area have existing populations of listed plants: Greenhill, Balboa, Oxbow West, Speedway, Vinci, Long Tom, Spectra Physics, North Taylor, Willow Corner Annex, Rosy, Fir Butte, Turtle Swale, Hansen, Isabelle (Table 8). Most of the existing plants in the planning area are naturally occurring, but the BLM has conducted some seeding and planting to augment existing

populations. The BLM has introduced or augmented Willamette daisy at Greenhill; Bradshaw's lomatium at Greenhill, Balboa, and Rosy; and Kincaid's lupine at Greenhill, Oxbow West, Turtle Swale, Hansen, and Isabelle.

Table 8. Current populations of threatened and endangered plant species in the planning area by site

site	Willamette daisy (# of plants)	Bradshaw's lomatium (# of plants)	Kincaid's lupine (m^2)
Greenhill	122	288	no survey
Balboa	31	60	
Oxbow West	3,881		83
Speedway	2,597	270	
Vinci	576	no survey	
Long Tom		824	
Spectra Physics			
North Taylor		810	
Willow Corner Annex		4	
Rosy		344	
Fir Butte			2,426
Turtle Swale			13
Hansen			15
Isabelle			3
Total	**7,207**	**2,600**	**2,540**

Fender's blue butterfly

The Fender's blue butterfly (*Icaricia icarioides fenderi*) is listed as endangered under the Endangered Species Act. Its current range is confined to the Willamette Valley of Oregon. The Recovery Plan describes in detail the listing status and critical habitat, population trends and distribution, life history and ecology, habitat characteristics, threats/reasons for listing, and conservation measures for Fender's blue butterfly (USFWS 2010, pp. II-1 – II-8; III-1 – III-9; IV-6 – IV-18). Those descriptions are incorporated here by reference. Fender's blue butterfly is found exclusively in prairie habitats containing its larval food plants, primarily Kincaid's lupine, but also spur lupine (*Lupinus arbustus*) and occasionally sickle-keeled lupine (*L. albicaulis*). Fender's blue butterfly nectars on several plant species, which are critical components of their food source. The long term survival of this species is threatened due to the loss and fragmentation of native prairie to urban development; habitat degradation by encroachment of woody vegetation and highly invasive weeds; and the vulnerability of small, isolated populations to extirpation from local events. These butterflies have limited dispersal ability and remain close to their

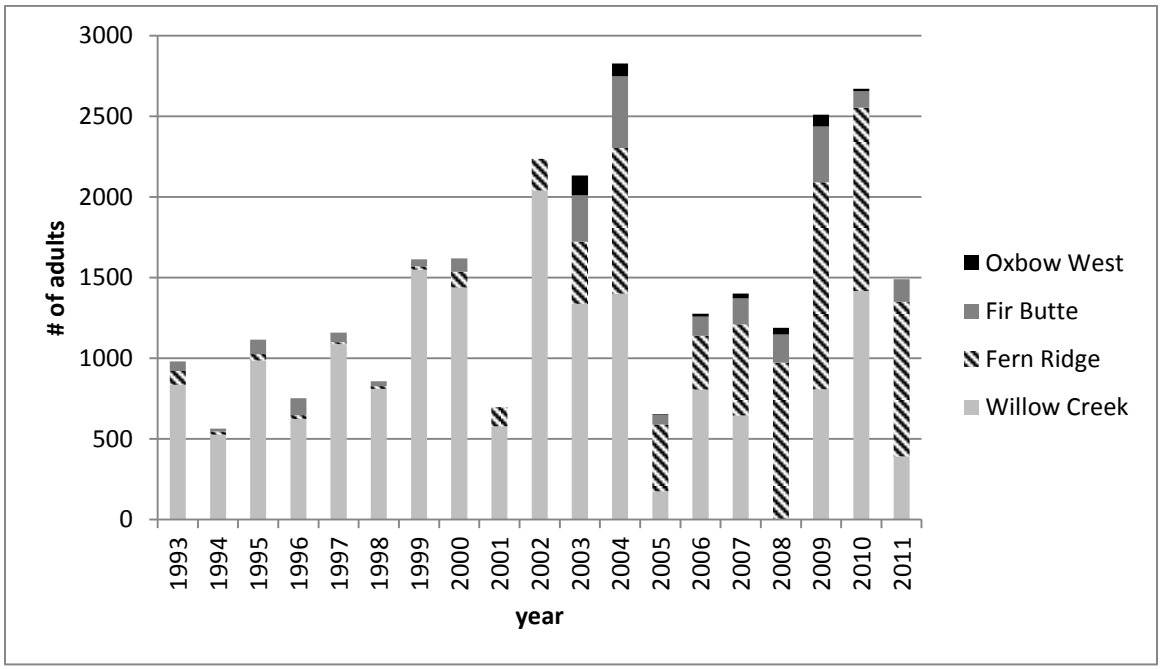
natal lupine patches when foraging: more than 95% of Fender's blue butterflies are found within 33 feet of lupine patches (Schultz 1998).

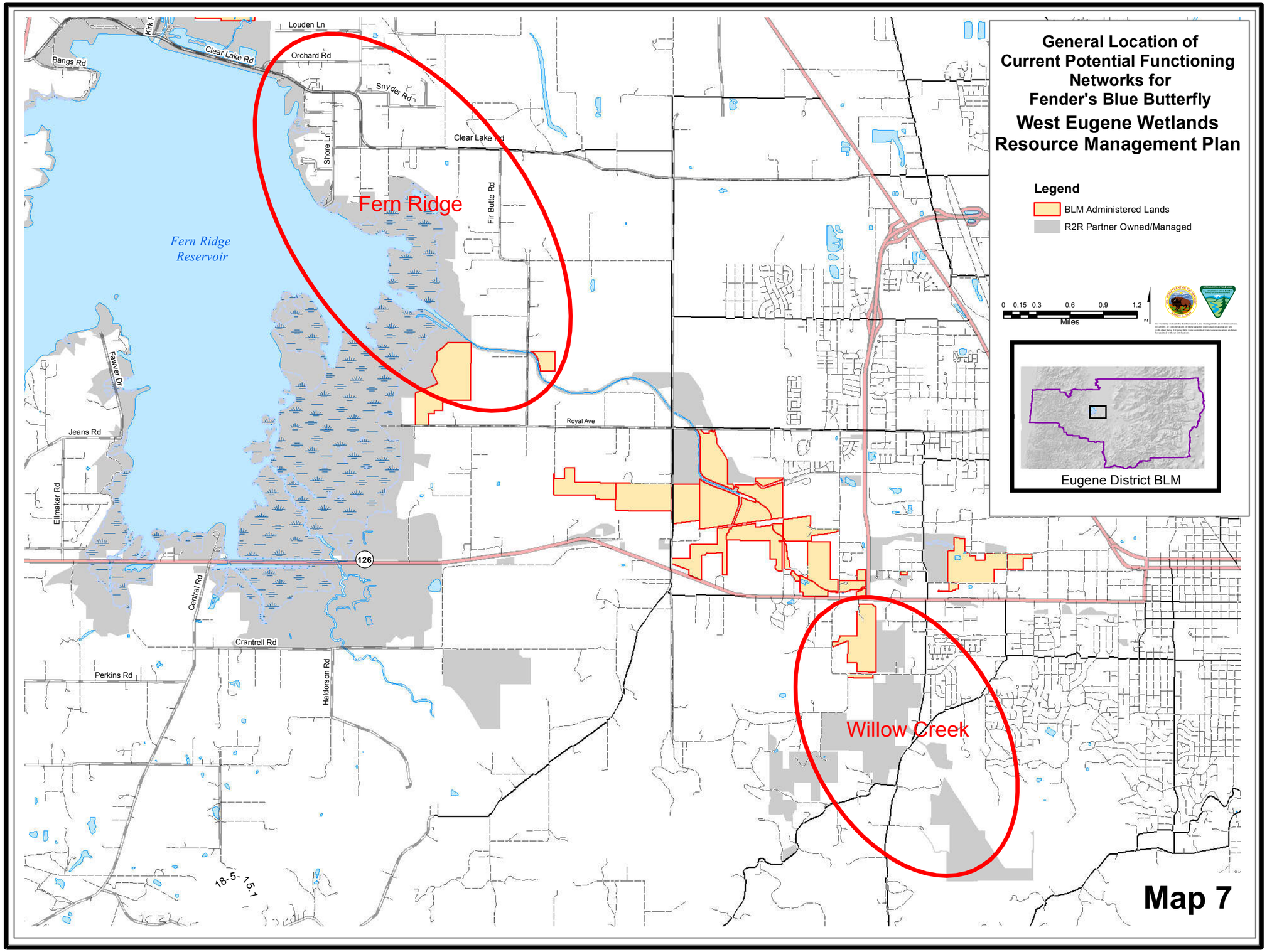
The planning area is located within the Eugene recovery zone identified in the Recovery Plan (USFWS 2010, pp. IV-10), an area spanning the valley floor and foothills from east to west and ranging from south of the city of Eugene generally to the northern Lane County border. Critical habitat for the Fender's blue butterfly was designated on October 31, 2006 with four primary constituent elements identified: prairie or oak savanna with a mosaic of low-growing native vegetation, absence of dense canopy and undisturbed soils; presence of larval host plants; forbs for adult nectar sources; and suitable "stepping stone" habitat within 1.2 miles of natal lupine patches (USFWS 2006).

There are currently 3,000 – 5,000 butterflies in 16 isolated populations or subpopulations of Fender's blue butterfly within the Willamette Valley.

The Fender's blue butterfly population in the planning area totaled 136 adults in 2011, and has ranged from 109 to 525 adults since 2003. Adult Fender's butterflies and/or their eggs have been monitored within the three West Eugene Wetland partner-managed lands (The Nature Conservancy, U.S. Army Corps of Engineers, and BLM) within the planning area boundary since 1993. These populations exhibit natural year to year variability (Figure 9). The BLM manages one large population at Fir Butte, with several smaller populations between The Nature Conservancy site at Willow Creek and the U.S. Army Corps of Engineers sites at Fern Ridge (see Map 7).

Figure 9. Fender's blue butterfly populations within the planning area boundary




General Location of
Current Potential Functioning
Networks for
Fender's Blue Butterfly
West Eugene Wetlands
Resource Management Plan
Legend
BLM Administered Lands
R2R Partner Owned/Managed
0 0.15 0.3 0.6 0.9 1.2
Miles
Eugene District BLM
Fern Ridge
Willow Creek
Fern Ridge
Reservoir
Louden Ln
Orchard Rd
Bangs Rd
Clear Lake Rd
Snyder Rd
Shore Ln
Fir Butte Rd
Royal Ave
Jeans Rd
Ellmaker Rd
Fawver Dr
Central Rd
Crantrell Rd
Perkins Rd
Haldorson Rd
126
18-5-15-1
Map 7

The Recovery Plan identifies two potential functioning networks within the planning area boundary: Willow Creek and West Eugene. Potential functioning networks are areas that the Recovery Plan identifies as having the greatest potential to support viable populations of Fender's blue butterfly (USFWS 2010, pp. IV-12 - IV-18). The Coburg network, which the Recovery Plan identifies as a potential functioning network within the Eugene recovery zone, is not within the planning area boundary or the geographic scope of this analysis. The Willow Creek population, which is partiallywithin the southern portion of the planning area boundary, includes no BLM-administered sites. The West Eugene population includes all of the current BLM-administered Fender's blue butterfly sites (Table 9).

Table 9. Existing Fender's blue butterfly sites within the planning area boundary (USFWS 2010)

population	site	ownership
Willow Creek	Fir Grove	The Nature Conservancy
	Willow Creek Bailey Hill	The Nature Conservancy
	Willow Creek Main	The Nature Conservancy
	Willow Creek North Area	The Nature Conservancy
West Eugene	Big Spires	U.S. Army Corps of Engineers
	Eaton Lane (N & S)	U.S. Army Corps of Engineers
	Fir Butte	BLM
	N. Fisher Butte	U.S. Army Corps of Engineers
	N. Green Oaks	U.S. Army Corps of Engineers
	S. Green Oaks	U.S. Army Corps of Engineers
	Turtle Swale	BLM
	Oxbow West	BLM/City of Eugene
	Hansen	BLM
	Isabelle	BLM

This analysis assesses the high quality habitat for Fender's blue butterfly. High quality habitat is defined for this analysis as all high quality wet prairie, high quality upland prairie, and high quality oak savanna. These plant communities are assumed to provide the nectar species, but may not meet requirements for Kincaid's lupine, patch size and connectivity described in the Recovery Plan. The analysis also analyzes the amount, size, and connectivity of high quality habitat with populations of Kincaid's lupine, the larval food plant for Fender's blue butterfly. The Recovery Plan set targets for Fender's blue butterfly habitat in patches of at least 15 acres that are within 1.2 miles of another patch; or smaller patches that are within 0.6 miles of another patch (USFWS 2010, p. IV-10). Connectivity of habitat is described both in the terms identified for suitable habitat from the Recovery Plan and with a smaller threshold distance between patches, as described in detail in the issue related to native plant communities.

There are currently approximately 457 acres in the Willamette Valley with foraging and/or breeding Fender's blue butterflies. Of these sites, half are less than five acres in size, which is substantially less than the 15-acre threshold size for patches of suitable habitat.

There are currently approximately 14 acres in the planning area with foraging and/or breeding Fender's blue butterflies. Although these areas have Fender's blue butterflies and their host plant, Kincaid's lupine, the overall habitat condition is not currently high quality wet prairie, high quality upland prairie, or high quality oak savanna. These sites have been monitored for habitat conditions and have been documented to be low quality habitat because of excessive litter layers, woody vegetation, and cover of non-native species, and low diversity and number of native nectar species present (Institute for Applied Ecology 2010). Therefore, by the definitions used in this analysis, there are currently no acres of high quality habitat for Fender's blue butterfly in the planning area.

Similarly, none of the Fender's blue butterfly sites on other land ownerships within the planning area boundary meet the habitat conditions for high quality wet prairie, high quality upland prairie, or high quality oak savanna. As detailed above in the issue related to native plant communities, the only high quality prairie or savanna habitat within the planning area boundary is 63 acres of wet prairie and 3 acres of upland prairie on City of Eugene land at Coyote Prairie. This site does not have any population of Fender's blue butterfly or its larval food plant, Kincaid's lupine. Because there are currently no sites within the planning area boundary with high quality habitat and populations of Kincaid's lupine, there is no connectivity of habitat for Fender's blue butterfly under the current conditions.

Both currently occupied and currently unoccupied Fender's blue butterfly habitat in the planning area have been identified as essential to the recovery of the species because of their role in connecting the current West Eugene and Willow Creek populations, as well as contributing to population persistence and dispersal movement (McIntire et al. 2007).

How would BLM management actions affect BLM sensitive and strategic plant and animal species?

Key Points
• Sensitive and strategic plant species in the planning area are associated with prairie habitats similar to the listed plant species. • Most sensitive and strategic animal species in the planning area are associated with aquatic habitats or prairie habitats.

The BLM Special Status Species policy directs that the BLM conserve species and the ecosystems on which they depend, and manage sensitive species so that management activities would not contribute to the need to list the species under the Endangered Species Act (BLM 2008b). Species designated as BLM sensitive species are native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

- There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range, or
- The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

Strategic species are those which share some of the criteria for BLM sensitive species but are not documented on federal lands in Oregon; are undescribed; or have questionable taxonomy. Instruction Memorandum No. OR-2012-018, dated December 12, 2011, which includes the selection criteria, is available on-line at
http://www.fs.fed.us/r6/sfpnw/issssp/documents/ag-policy/im-or-2012-018.pdf.
The complete list of special status species is available on-line at
http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/.

BLM Sensitive Vascular Plants

The BLM sensitive vascular plant species known to occur in the planning area are Hitchcock's blue-eyed grass, white-topped aster, shaggy horkelia, thin-leaved peavine, Oregon timwort, and cluster goldweed. In addition to their status as BLM sensitive species, Hitchcock's blue-eyed grass, white-topped aster, and shaggy horkelia are identified by the U.S. Fish and Wildlife Service as species of concern. The Recovery Plan describes the status, ecology, habitat, threats, and conservation measures for Hitchcock's blue-eyed grass, white-topped aster, and shaggy horkelia. Those descriptions are incorporated here by reference (USFWS 2010, pp. II-45 – II-53).

Hitchcock's blue-eyed grass is a perennial herb that occurs in valley grassland and oak savannas from northern California to the Willamette Valley. Known sites in the planning area are at Greenhill, Turtle Swale, Vinci, and Balboa.

White-topped aster is a perennial herb that occurs in prairies, oak savanna, and oak woodlands from the Willamette Valley to British Columbia. Known sites in the planning area are at Balboa, Beaver Run, Fir Butte, Greenhill, Hansen, Isabelle, Oak Hill, Oxbow West, Spectra Physics, Speedway, Turtle Swale, and Vinci.

Shaggy horkelia is a perennial herb that occurs in prairie and oak savanna in the Willamette Valley and grassy balds in the Umpqua Valley. Known sites in the planning area are at Balboa, Greenhill, Long Tom, Rosy, Speedway, and Vinci.

Thin-leaved peavine is a perennial herb that occurs along roadsides and fencerows in the Willamette Valley and possibly the Coast Range and Cascade Mountains (Currin et al. 2008; ORBIC 2010, p. 61). The U.S. Fish and Wildlife Service had originally considered thin-leaved peavine as a species of concern, but did not include it in the Recovery Plan because of insufficient information about its ecology and locations (USFWS 2010, p. G-5). The only known site in the planning area is at South Taylor.

Oregon timwort is an annual herb that occurs in wet prairies in the Willamette Valley, Coast Range, Klamath Mountains, as well as California. There are known sites in the planning area at Balboa, Beaver Run, Danebo, Greenhill, Isabelle, Long Tom, Neilson, Oxbow East, Oxbow West, Rosy, Spectra Physics, Speedway, Summer Oaks, Turtle Swale, Vinci, and Willow Corner Confluence.

Cluster goldweed is a perennial herb that occurs in wet prairies in the Willamette Valley and California. There are known sites in the planning area at Greenhill, Oxbow West, Turtle Swale, Vinci, and Willow Corner Annex.

In addition to populations in the planning area, the Recovery Plan and the Oregon Biodiversity Center list several locations for these species within the planning area boundary on other land ownerships (Oregon Biodiversity Center 2011; BLM Monitoring Data 2008-2011; BLM Geobob 2011) (Table 10).

Table 10. Current abundance of BLM sensitive and strategic plant species within the planning area boundary (# of plants, except as noted)

Species	BLM	The Nature Conservancy	U.S. Army Corps of Engineers	City of Eugene	total
Hitchcock's blue-eyed grass (*Sisyrinchium hitchcockii*)	343	100			443
White-topped aster[7] (*Sericocarpus rigidus*)	59 m^2	139 m^2	96 m^2		294 m^2
Shaggy horkelia (*Horkelia congesta* ssp. *congesta*)	943	108	3466	800	5,317
Thin-leaved peavine (*Lathyrus holochlorus*)	1		2		1
Oregon timwort (*Cicendia quadrangularis*)	1,102	2			1,103
Cluster goldweed (*Pyrrocoma racemosa* var. *racemosa*)	1,006	4,000	13,964	25	18,995
Bruchia flexuosa	1,722 m^2				1,722 m^2
Ephemerum crassinervium	419 m^2				419 m^2
Ephemerum serratum	1,062 m^2				1,062 m^2
Pseudephemerum nitidum	1,162 m^2				1,162 m^2

No restoration targets have been set for the U.S. Fish and Wildlife species of concern in the Recovery Plan, nor have restoration targets been set for any of the other BLM sensitive plants in the planning area. For the purpose of this analysis, the Recovery Plan is used as a guideline to establish vascular plant targets (T. Kaye, *personal communication*, November 28, 2011). The abundance and distribution recovery targets for Willamette daisy and Bradshaw's lomatium are used as restoration targets for Hitchcock's blue-eyed grass, shaggy horkelia, Oregon timwort, and cluster goldweed (Table 11). The abundance and distribution recovery targets for Kincaid's lupine are used as recovery targets for white-topped aster, because both species are more easily measured in foliar cover than number of individuals. The abundance and distribution recovery targets for golden paintbrush are used for thin-leaved peavine, because it tends to be found to a lesser degree in habitats that are suitable and current information

[7] The abundance of white-topped aster is measured in square meters of plant cover because of the difficulty in distinguishing individual plants. Some survey information on white-topped aster is presented in number of ramets. For the purpose of this analysis, survey information in number of ramets has been converted to square meters based on the average cover in BLM plant data: 650 ramets/square meter.

about the species status has not been well quantified. None of the species of BLM sensitive vascular plants currently meet restoration targets except cluster goldweed (Table 10).

Table 11. Restoration targets for BLM sensitive plants in the planning area

species	abundance (# of plants, except as noted)	distribution (# of populations)
Hitchcock's blue-eyed grass	15,000	3
White-topped aster	7,500 m^2	3
Shaggy horkelia	15,000	3
Thin-leaved peavine	1,000	1
Oregon timwort	15,000	3
Cluster goldweed	15,000	3
Bruchia flexuosa	1,575 m^2	4
Ephemerum crassinervium	362 m^2	2
Ephemerum serratum	1,019 m^2	2

Because the restoration targets for the BLM sensitive vascular plants are derived from the recovery targets for threatened and endangered plants in the Recovery Plan, the scope for this analysis is the same as for the analysis of threatened and endangered plants: the geographic scope is the Eugene West Recovery Zone, and the temporal scope if for short-term (4 years) and long-term (15 years) effects.

There are no strategic vascular plants known to occur In the planning area.

BLM Sensitive and Strategic Mosses

The BLM sensitive non-vascular plant species known to occur in the planning area are three species of mosses: *Bruchia flexuosa, Ephemerum crassinervium,* and *Ephemerum serratum*. The only strategic plant known to occur in the planning area is another moss: *Pseudephemerum nitidum*.

There is little information on the status, ecology, habitat, threats, and conservation measures for the BLM sensitive and strategic mosses in the planning area. *Bruchia flexuosa* has been found in the Willamette Valley, California, Wisconsin, and in Europe (ORBIC 2010, p. 82). *Bruchia flexuosa* appears to need bare soil to flourish, and minimal competition from vascular plants. In Oregon, it has been found to inhabit wet prairies and mud flats around reservoirs (Christy 2006). *Ephemerum crassinervium* has been found in the Willamette Valley, Klamath Mountains, Kansas, and New Zealand. *Ephemerum crassinervium* is an ephemeral species (i.e., it has a very short life cycle) and occurs on damp disturbed soil (Harpel 2008a). *Ephemerum serratum* is also an ephemeral species that occurs on damp disturbed

soil (Harpel 2008b). It has been found in the Willamette Valley, California, Saskatchewan, New Zealand, Europe, and Africa (ORBIC 2010, p.83).

The current population of *Bruchia flexuosa* in the planning area is a total of 1,700 square meters at five sites: Fir Butte, Hansen, Speedway, Danebo, and Vinci.[8] The current population of *Ephemerum crassinervium* in the planning area is a total of 400 square meters at three sites: Fir Butte, Hansen, and Vinci. The current population of *Ephemerum serratum* in the planning area is a total of 1,100 square meters at three sites: Hansen, Danebo, and Vinci. The current population of *Pseudephemerum nitidum* in the planning area is a total of 1,200 square meters at three sites: Fir Butte, Hansen, and Long Tom.

The Nature Conservancy and the U.S. Army Corps of Engineers have identified the presence of these moss species on their lands within the planning area boundary, but have not specifically identified or quantified any occurrences (S. Villegas-Moore, BLM, *personal communication,* May 17, 2012).

The restoration target for the three BLM sensitive moss species is to maintain the existing larger populations (>100 square meters). It is not possible to derive more specific restoration targets because of the general lack of information on these species.

BLM Sensitive and Strategic Animals

In accordance with BLM Special Status Species policy, this section identifies the sensitive and strategic species known or suspected to occur on BLM-administered lands in Oregon. Of these special status species, 64 are terrestrial wildlife species, including invertebrates, known or suspected to occur in the Eugene District. Of these 64 species, 37 are sensitive species (including federal threatened or endangered species), of which 19 are documented to occur in the Eugene District and 18 are suspected to occur; 27 are strategic species of which 4 are documented to occur in the Eugene District and 23 are suspected to occur.

Of these 64 species, 24 are known or suspected to be associated with Willamette Valley plant communities in the planning area. The endangered Fender's blue butterfly is evaluated separately in the issue above related to threatened and endangered species. The status and life history of the remaining 23 terrestrial wildlife species are described below. Table 12 shows the plant community associations of each species.

The BLM sensitive animal species documented to occur in the planning area are the dusky Canada goose, white-tailed kite, American peregrine falcon, grasshopper sparrow, Oregon vesper sparrow, purple martin, Lewis' woodpecker, and Western pond turtle. Two BLM strategic animal species are documented to occur in the planning area: the bald Hesperian and dog star skipper.

[8] The abundance of these mosses is measured in square meters of plant cover because of the difficulty in distinguishing individual plants.

For the BLM sensitive and strategic species known or suspected to be associated with Willamette Valley plant communities in the planning area, there is too little information available to estimate current populations or evaluate the effects of the alternatives on population numbers directly. In addition, there are no specific restoration targets for populations of these species in the planning area. This analysis will evaluate the current condition and the effects of the alternatives on these species by the abundance and condition of habitat for each species within the planning area, as described below.

Dusky Canada goose is a BLM sensitive species that is documented to occur in the planning area. This subspecies nests in Alaska and winters almost exclusively in the Willamette Valley and lower Columbia River Basin (ORBIC 2010, p. 14; Bromley and Rothe 2003). Here it feeds primarily in nutrient-rich croplands. Its status in western Oregon is due to excessive hunting (now regulated) and habitat losses and predation on its Alaska breeding grounds. This goose winters in the planning area where it has access to nearby croplands and rests in areas where it readily sees approaching predators. Thus, open water, mud flats, and low (≤ 12 inches) grass and forb cover with sparse shrubs and trees benefit this species (ODFW 2011, p. 2; Bromley and Rothe 2003). For the purpose of this analysis, dusky Canada goose habitat will be evaluated as total acres of open water, low quality emergent wetlands, high quality emergent wetlands, and high quality wet prairie. There are currently 17 acres of open water and 146 acres of low quality emergent wetlands in the planning area. There are currently no acres of high quality emergent wetlands or high quality wet prairie in the planning area.

Aleutian Canada goose is a BLM sensitive species that is suspected, but not documented, to winter in the planning area; no survey has been done (ORBIC 2010, p. 14). Like the dusky Canada goose, the Aleutian Canada goose breeds in Alaska, where they were subjected to excessive hunting (now regulated), habitat modification and predators introduced to their breeding grounds. This accounts for their status in Oregon. The habitats and diet of the Aleutian Canada goose are similar to those of other Canada geese. In Oregon, during the fall migration, they stop in croplands, wetlands, and sub-irrigated meadows where they can find water and loafing platforms with clear views in all directions. During the spring migration, they stop for residual foods on croplands, and in wetlands and meadows where they can obtain arthropods and berries. Their community associations are the same as those of the dusky Canada goose, and, for the purpose of this analysis, Aleutian Canada goose habitat will be evaluated the same as dusky Canada goose habitat.

Table 12. Plant community association of BLM sensitive and strategic animal species

	Freshwater/ Riverine	Open Water	Emergent Wetlands	High Quality Wet Prairie	Low Quality Wet Prairie	High Quality Upland Prairie	Low Quality Upland Prairie	Oak Savanna	Oak Woodlands	Ash Swale/ Riparian	Douglas-fir forest
Dusky Canada goose *Branta canadensis occidentalis*		X	X	X							
Aleutian Canada goose *Branta hutchinsii leucopareia*		X	X	X							
White-tailed kite *Elanus leucurus*	X	X	X	X		X					
American peregrine falcon *Falco peregrinus anatum*	X	X	X	X		X					
Grasshopper sparrow *Ammodramus savannarum*				X		X					
Oregon vesper sparrow *Pooecetes gramineus affinis*						X		X			
Streaked horned lark *Eremophila alpestris strigata*				X		X					
Purple martin *Progne subis*								X	X	X	X
Lewis' woodpecker *Melanerpes lewis*									X		X
Western pond turtle *Actinemys marmorata marmorata*	X	X	X	X		X					
Painted turtle *Chrysemys picta*	X	X	X	X		X					
Pallid bat *Antrozous pallidus*				X		X		X	X		X
Fringed myotis *Myotis thysanodes*											X
Taylor's checkerspot *Euphydryas editha taylori*							X	X	X		
Dog star skipper *Polites sonora siris*				X		X					
Marsh ground beetle *Acupalpus punctulatus*				X							
American grass bug *Acetropis americana*				X							
Umbrose seed bug *Atrazonotus umbrosus*								X	X		
Salien plant bug *Criocoris saliens*	X		X								
Arizona stink bug *Dendrocoris arizonensis*								X	X		
Martin's water measurer *Hydrometra martini*		X									
Mulsant's water treader *Mesovelia mulsanti*		X									
Bald Hesperian *Vespericola sp. nov.*	X		X	X							

White-tailed kite is a BLM sensitive species that is documented to occur in the planning area. This kite is a relatively recent arrival to western Oregon; their low population accounts for their status. They are yearlong residents of the Willamette Valley and are documented in the planning area. Nesting in the planning area is suspected but not verified. This kite preys almost exclusively on small mammals. They hunt by hovering, which requires open spaces. Habitats include grasslands, agricultural areas, wetlands and savannas; higher quality, more diverse, habitats support a better prey base. They are tree nesters, usually building stick nests in the tops of trees 20 to 50 feet off the ground. During the non-breeding season, kites can be found in small stands of trees communally roosting with more than 100 individuals. (BirdWeb; Cascade Raptor Center 2012; Henny and Annear 1978). For the purpose of this analysis, white-tailed kite habitat will be evaluated as acres of freshwater/riverine, open water, low quality emergent wetlands, high quality emergent wetlands, high quality wet prairie, and high quality upland prairie. There are currently 2 acres of freshwater/riverine, 17 acres of open water, and 146 acres of low quality emergent wetlands in the planning area. There are currently no acres of high quality emergent wetlands, high quality wet prairie, or high quality upland prairie in the planning area.

American peregrine falcon is a BLM sensitive species that is documented to occur in the planning area. A summer resident and documented breeder in the Willamette Valley, peregrines forage in the planning area but do not nest there due to the lack of nesting substrate (cliffs and rock outcrops). Their status is due to past population declines from chemical contamination, now resolved. Although peregrines forage for and prey on birds in a wide variety of habitats, their response to BLM management actions in the planning area would be best measured by the restoration of habitats where their prey concentrate. For the purpose of this analysis, American peregrine falcon habitat will be evaluated the same as white-tailed kite habitat.

Grasshopper sparrow is a BLM sensitive species that is documented to occur in the planning area. This sparrow is a documented summer resident in the planning area, where it breeds in groups of 3 to 12 pairs (ORBIC 2010, p.14; Ashley and Stoval 2004). A ground-nesting species, this sparrow prefers ≥200-acre patches of contiguous prairie habitat with areas of bare ground, low (≤ 18 inches) grass cover and sparse shrub (≤ 35 percent) and tree (≤ 10 percent) cover. Exposed bare ground is an essential habitat feature for foraging. Its status in western Oregon is due to past habitat losses from wildfire suppression and conversion for agricultural and other uses. Although this species is well-adapted to light grazing, disturbances associated with low quality remnant upland prairie, such as agriculture, heavy grazing and shrub/tree conversion, are detrimental to this species (ODFW 2011, pp. 2, 5, 7; Myers and Kreager 2010, p. 9; Ashley and Stoval 2004). For the purpose of this analysis, grasshopper sparrow habitat will be evaluated as total acres of high quality wet prairie or high quality upland prairie in contiguous patches ≥200 acres (contiguous patches may have gaps of ≤75 feet). There are currently no acres of high quality wet prairie or high quality upland prairie in the planning area.

Oregon vesper sparrow is a BLM sensitive species that is documented to occur in the planning area. This sparrow is a documented summer resident in Lane County and a suspected breeder in the planning area (ORBIC 2010:17). This migratory bird prefers grasses 6 to 12 inches high, interspersed by small woody vegetation and bare ground. They also can be found in edge habitat between grassy and wooded areas.

Although the nests of the grasshopper and vesper sparrows are similar, the amounts of land they need to successfully rear their young are different. The vesper sparrow may be present in smaller patches of habitat (10 to 20 acres) and is less tied to large landscape patches. Although vesper sparrows are well-adapted to light grazing, disturbances associated with low quality remnant upland prairie, such as agriculture, heavy grazing and shrub/tree conversion, are detrimental to this species (ODFW 2011, pp. 2, 5-7). For the purpose of this analysis, Oregon vesper sparrow habitat will be evaluated as total acres of high quality upland prairie in patches ≥10 acres (no gaps), low quality oak savanna, and high quality oak savanna. There are currently 23 acres of low quality oak savanna and no acres of high quality upland prairie or high quality oak savanna in the planning area.

Streaked horned lark is a BLM sensitive species that is suspected to occur in the planning area and is a candidate for listing as threatened or endangered. This bird is a documented summer resident in Lane County and a suspected breeder in the planning area (ORBIC 2010, p. 16). In the Willamette Valley, this ground-nesting species is associated with herbaceous-dominated habitat and wetland mudflats, dominated by short grasses (0 to 6 inches high), relatively high percent of bare ground (17 percent) for territories, and a higher percent cover of bare ground (31 percent) for nest sites. To avoid predators, horned larks forage and nest in flocks of more than 100 birds. Thus, they prefer large expanses of habitat of undefined extent, but assumed to be similar to that needed by the grasshopper sparrow. Although well-adapted to light grazing, disturbances associated with low quality remnant upland prairie, such as agriculture, heavy grazing and shrub/tree conversion, are detrimental to this species (ODFW 2011, pp. 2, 6, 7; Pearson and Altman 2005). For the purpose of this analysis, streaked horned lark habitat will be evaluated the same as grasshopper sparrow habitat.

Purple martin is a BLM sensitive species that is documented to occur in the planning area. This bird is a documented summer resident and nester in the planning area (ORBIC 2010, p. 18). Purple martins typically nest colonially, but will nest individually in habitats with insufficient cavities for colonial nesting. Loss of colonial nesting habitat appears to be the principal reason for their status. Nesting habitat varies widely: cavities or rot pockets in trees in open water, grassy fields, and recent clear-cuts and burns with brush and young trees. All colonies are in openings, with a mean distance from the nest cavity to large canopy trees of 470 feet. Features common to all nest sites include distance greater than 20 feet to large live trees, presence of an unoccupied cavity, and for sites over land, height of more than 16 feet above the brush and young trees. Purple martins nest in a variety of snags, including Douglas-fir, cottonwood, ash, willow and oak. In Oregon, Douglas-fir snags are most commonly used, and mean diameter of these snags is 3.9 feet. Purple martins select snags which are apart from live canopy trees. The snags used by purple martins are often far from water, with a mean distance of 1.5 miles to open water (Horvath 1999). For the purpose of this analysis, purple martin habitat will be evaluated as total acres of low quality oak savanna, high quality oak savanna, oak woodlands, ash swale/riparian, and Douglas-fir forest. There are currently a total of 316 acres in these plant communities in the planning area.

Lewis' woodpecker is a BLM sensitive species that is documented to occur in the planning area. A documented yearlong resident in the planning area, this woodpecker nests in tree cavities (ODFW 2011,

p. 2; ORBIC 2010, p. 17). Their status is due to the loss of breeding habitat, primarily from fire suppression and conversion for other uses. Open forest facilitates foraging and is consistently associated with breeding habitat. While a certain number of trees are necessary for nesting and perching sites, a closed canopy forest is not suitable due to reduced visibility, limited room for aerial maneuvers, and retarded shrub development. Ideal breeding habitat consists of no more than 30 percent tree canopy closure. Because Lewis' woodpeckers are weak cavity excavators, they prefer to excavate nests in trees in advanced stages of decay (i.e., snags ≥26 inches in diameter), re-use pre-existing cavities, or usurp cavities from other woodpecker or secondary cavity-nesting species. Lewis' woodpeckers have not been observed excavating in live trees. Once snags have reached the state at which their tops begin to break off and their wood begins to soften, conditions may develop that are more conducive to excavation. Riparian cottonwood also tends to provide suitable nest sites because of the soft nature of decaying cottonwood, frequent rot conditions in cottonwood trees, and the abundance of aerial insects associated with riparian habitats. Due to losses of trees/snags, conversion of oak woodland to oak savanna would be detrimental to this species (Abele et al. 2004, pp. 15, 17). For the purpose of this analysis, Lewis' woodpecker habitat will be evaluated as total acres of oak woodlands and Douglas-fir forest in the planning area. There are currently a total of 121 acres in these plant communities in the planning area.

Western pond turtle is a BLM sensitive species that is documented to occur in the planning area. A documented yearlong resident in the planning area (ORBIC 2010, p. 13), the pond turtle's status is due primarily to loss of aquatic and terrestrial habitats. It is associated with high quality ponds or riparian areas with slow-moving water, with basking sites. Individuals spend up to 7 months per year in upland areas within 490 feet of open water and may travel more than 3,200 feet between aquatic habitats. Pond turtles also nest in high quality upland habitats with good sun exposure, most commonly within 650 feet of open water. Depending on the availability of still water, they overwinter in the substrate of ponds or in undercut areas along the bank, or burrow in upland habitats, usually under trees or shrubs, within 1,450 feet of open water (Rosenberg et al. 2009, pp. 18-20; Bury and Germano 2008, pp. 1, 4-6). For the purpose of this analysis, Western pond turtle habitat will be evaluated using three elements:

1) Yearlong habitat - total acres of high quality wet prairie and high quality upland prairie ≤490 feet from freshwater/riverine or open water habitat together with acres of open water, low quality emergent wetlands, high quality emergent wetlands; this reflects the habitat where pond turtles are expected to occur during most of the year.
2) Preferred nesting habitat - total acres of high quality wet prairie and high quality upland prairie ≤650 feet from freshwater/riverine or open water habitat together with acres of open water, low quality emergent wetlands, high quality emergent wetlands.
3) Connected habitat - acres of freshwater/riverine, open water and emergent wetland habitat (grouped together) separated by ≤3,200 feet of contiguous patches of high quality wet prairie, high quality upland prairie, and both oak communities (contiguous patches may have gaps of ≤300 feet; limit analysis to acres of the largest network).

There are currently 2 acres of freshwater/riverine, 17 acres of open water, and 146 acres of low quality emergent wetlands, for a total of 165 acres of yearlong habitat and the same acreage of preferred

nesting habitat. There are currently no acres of high quality emergent wetlands, high quality wet prairie, or high quality upland prairie in the planning area; therefore, there are no acres of connected habitat.

Painted turtle is a BLM sensitive species. This turtle is not known or suspected in the planning area, but is associated with habitats found in the planning area and is documented to occur in Lane County (ORBIC 2010, p. 13). Its status is due to habitat loss, predation from introduced fish and bullfrogs, competition with introduced turtle species, recreation-related mortality, habitat damage, and pollution. Habitat requirements are similar to those of pond turtles except that upland habitats are used almost exclusively for nesting (with almost all nests within 150 feet of open water); hibernation is not physiologically necessary. Little is known of their dispersal behavior. They are found as much as 1,500 feet from water, so dispersal capabilities are assumed to be similar to those of pond turtles (Gervais et al. 2009, pp. 12-14, 29, 33-38). For the purpose of this analysis, painted turtle habitat will be evaluated as two elements:

1) Preferred nesting habitat - total acres of high quality wet prairie and high quality upland prairie ≤150 feet from freshwater/riverine or open water habitat together with acres of open water, low quality emergent wetlands, high quality emergent wetlands
2) Connected habitat the same as for Western pond turtles.

There are currently 2 acres of freshwater/riverine, 17 acres of open water, and 146 acres of low quality emergent wetlands. There are currently no acres of high quality emergent wetlands, high quality wet prairie, or high quality upland prairie in the planning area.

Pallid bat is a BLM sensitive species. This bat is not known or suspected in the planning area, but is associated with Willamette Valley habitats found in the planning area. Its status is due to habitat losses and human disturbances at roost sites. Locally, pallid bats are associated with open oak-woodlands and prairie/grasslands with low vegetation. While foraging, they fly low over the ground, listen for low-frequency sounds made by invertebrates and land to capture. Thus, low, open vegetation is essential (patches 1,500 feet in length). Restoration of prairies and oak savanna should benefit this species. Proximity of tree/snag cavities or loose bark in sunny areas are needed for day roosting. Caves and cliffs are required for night and winter roosting. Trees ≥26 inches in diameter with loose bark are needed for maternity roosts. Thus, woodland/forest restoration should benefit this species (Sherwin and Rambaldini 2005; Ferguson and Jeffrey 2004). For the purpose of this analysis, pallid bat habitat will be evaluated as two elements: (1) total acres of low quality oak savanna, high quality oak savanna, oak woodlands, and Douglas-fir forest; and (2) total acres of high quality wet prairie and high quality upland prairie in contiguous patches ≥160 acres (160-acre patches are used as an approximation for patches 1,500 in length). Contiguous patches may have gaps of ≤75 feet. There are currently a total of 144 acres of low quality oak savanna, oak woodlands, and Douglas-fir forest in the planning area. There are currently no acres of high quality oak savanna, high quality wet prairie, or high quality upland prairie in the planning area.

Fringed myotis bat is a BLM sensitive species. This bat is not known or suspected to occur in the planning area, but is documented in Lane County (ORBIC 2010, p. 19). Studies in the Pacific Northwest indicate that this is primarily a forest species; large trees and snags with thick bark and cavities are key

habitat features. Habitat conditions for this species in the planning area are marginal. Recent studies in western Oregon (Arnett and Gruver 1999; Perkins and Peterson 1998; Cross et al. 1996) and northern California (Weller and Zabel 2001) found this species primarily using snags as roosts. Studies by Cross et al. (1996) utilizing radio-telemetry in the Medford and Roseburg BLM districts found summer day roosts occurred primarily in bark-covered snags that were in early-mid stages of decay, and that green trees also were used in smaller numbers. Thus, this species might benefit from forest restoration. For the purpose of this analysis, fringed myotis bat habitat will be evaluated as acres of Douglas-fir forest. There is currently less than one acre of Douglas-fir forest in the planning area.

Taylor's checkerspot is a BLM sensitive species that is suspected to occur in the planning area and is a candidate for listing as threatened or endangered. This butterfly is documented in Lane County (ORBIC 2010, p 31) and known to inhabit Willamette Valley low elevation prairie remnant meadows. Its status is due to habitat loss; encroachment by shrubs and trees due to fire suppression and industrial forest land management, invasion by non-native plants, elimination of natural disturbance regimes, cattle grazing, agriculture and urbanization. Coarse habitat for this butterfly includes prairies, savanna, and possibly some types of oak woodlands. Taylor's checkerspot uses a number of native and non-native plant species as nectar sources. In Oregon, the species currently is only known to use the non-native species English plantain (*Plantago lanceolata*) as a larval host. In Washington, harsh paintbrush (*Castilleja hispida*) and blue-eyed Marys (*Collinsia parviflora, C. grandiflora*) have been identified as larval food plants (Stinson 2005, p. 87). Both are native plants occurring in Lane County. However, uncertainties remain regarding how these species might be affected by habitat restoration in the planning area, and whether either plant could effectively replace English plantain as a larval host in the planning area. As with Fender's blue butterfly, because of its association with specific host and nectar plants, Taylor's checkerspot is strongly associated with short-stature prairie and oak savanna habitats that have a mosaic of low-growing grasses and forbs, low-density canopy cover (high solar exposure) and relatively undisturbed soils. However, because the species' only known larval host is a non-native species, restoration would be detrimental. The species' host and nectar plants and their upland prairie and oak savanna habitats are present in the planning area. Dispersal and nectaring distances for this species are poorly understood; best information estimates this species can disperse up to 0.9 mile between habitat patches under favorable conditions (i.e., low shrub-height vegetation). Dense stands of forest are probably barriers to flight (Benton County 2010, BLM 2010b, USFWS 2010, Stinson 2005, Weiss et al. 1987). For the purpose of this analysis, Taylor's checkerspot habitat will be evaluated as two elements: (1) total acres of low quality upland prairie, low quality oak savanna, high quality oak savanna, and oak woodlands; and (2) acres of low quality wet prairie, low quality upland prairie, and both oak communities separated by ≤4,750 feet (limit analysis to acres of the largest network). There is currently a total of 259 acres of low quality upland prairie, low quality oak savanna, and oak woodlands in the planning area. There are currently 626 acres of low quality wet prairie, low quality upland prairie, and both oak communities separated by ≤4,750 feet in the planning area.

Dog star skipper is a BLM strategic species that has been found in the planning area. This butterfly is documented in Lane County (ORBIC 2010, p. 31) and was photographed in 2007 at Willow. Fewer than 20 populations are known in Oregon, all in the Willamette Valley between Portland and Eugene. Its

status is due to the limited number of known populations throughout its range (west of Cascades from Olympic Peninsula to central California). Habitat needs and host plants are poorly understood. Larvae apparently will feed on a number of grasses including *Poa* and *Festuca*. This species is generally associated with native prairies, grasslands, and alpine meadows; woodland edges and clearings, stream banks and springs. This butterfly most likely would benefit from restorations of wet prairie and upland prairie habitats (Fleckenstein and Huff 2011). For the purpose of this analysis, dog star skipper habitat will be evaluated as the total acres of high quality wet prairie and high quality upland prairie. There are currently no acres of high quality wet prairie and high quality upland prairie in the planning area.

Marsh ground beetle is a BLM strategic species. It is not documented in Lane County (ORBIC 2010, p. 29). The range and habitat associations of this species are unknown, which accounts for its status. The only recent (1983) records are from the Finley National Wildlife Refuge, 10 miles south of Corvallis; these specimens were found under dead leaves and other litter in the soil in a seasonal wetland dominated by tufted hairgrass (*Deschampsia cespitosa*). Based on these data, it is likely that this beetle could be found in similar marshy/seasonal wetland/vernal pool habitats elsewhere in the Willamette Valley, including the planning area (J. LaBonte, Oregon Department of Agriculture, *personal communication to Dan Crannell, BLM,* 2011). For the purpose of this analysis, marsh ground beetle habitat will be evaluated as the total acres of high quality wet prairie. There are currently no acres of high quality wet prairie in the planning area.

American grass bug is a BLM strategic species. It is not documented in Lane County (ORBIC 2010, p. 28). Its status is due to the limited number of known occurrences and limited information on the life history of this species. In Oregon, specimens have been collected in low, wet grasslands of the Jackson-Frazier Wetlands near Corvallis; along the Yamhill River near McMinnville; and on the Finley National Wildlife Refuge in a grassy wet swale alongside the entrance road. The Finley and Corvallis sites appeared relatively undisturbed, potentially containing a large proportion of native grasses. American grass bugs have been collected only in undisturbed, wet native grasslands in the Willamette Valley. This species, like the marsh ground beetle, might be associated with tufted hairgrass (Brenner 2005; Lattin and Schwartz 1986). For the purpose of this analysis, American grass bug habitat will be evaluated the same as marsh ground beetle habitat.

Umbrose seed bug is a BLM strategic species. It is not documented in Lane County (ORBIC 2010, p. 28). Although this species is widespread across the U.S., it is rare in Oregon, which accounts for its status here. One specimen was found southwest of Corvallis. It is associated with pine and oak woodlands. (Applegarth 1995; Slater and Ashlock 1966). For the purpose of this analysis, Umbrose seed bug habitat will be evaluated as total acres of low quality oak savanna, high quality oak savanna, and oak woodlands. There are currently a total of 143 acres in these plant communities in the planning area.

Salien plant bug is a BLM strategic species. It is not documented in Lane County (ORBIC 2010, p. 28). It is not suspected to occur in the planning area. Its status is due to lack of information in Oregon. This bug is associated with its host plant, bedstraw (*Galium* spp.), which occurs in marshes, fens, low areas along rivers and ponds, swamps, wet sand prairies, prairie swales, and ditches (Applegarth 1995). For the

purpose of this analysis, Salien plant bug habitat will be evaluated as the total acres of freshwater/riverine and high quality emergent wetlands. There are currently 2 acres of freshwater/riverine and no acres of high quality emergent wetlands in the planning area.

Arizona stink bug is a BLM strategic species. It is not documented in Lane County (ORBIC 2010, p. 28). It is not suspected to occur in the planning area. The nearest confirmed occurrence is 6 miles north of Corvallis. It is found in the southwest U.S.; Oregon appears to be at the edge of its range. Its status is due to limited information on its range and habitat associations in Oregon. Elsewhere in its range, it is associated with pine and oak woodlands (Thomas and Brailovsky 1999; Applegarth 1995; Nelson 1955; Barber 1911). For the purpose of this analysis, Arizona stink bug habitat will be evaluated the same as Umbrose seed bug.

Martin's water measurer is a BLM strategic species. It is not documented in Lane County (ORBIC 2010, p. 28). This insect is not suspected to occur in the planning area, but is associated with habitats found in the planning area. Its status is due to limited distribution and records-of-occurrence in Oregon; possibly an artifact of limited survey but more likely a result of the species' natural range. During most of the year, Martin's water measurer requires still or slow-moving water with emergent or floating vegetation. Adults rarely move far from floating vegetation that is shaded by plants along the water's edge. Shade appears to be a necessary component of their habitat and influences much of their daily activity. They are more active during cooler parts of the daylight hours, and then retreat to shade during the hottest portion of the day. Vegetation also is important for reproduction; Martin's water measurer "glues" its eggs, individually, to vertical plant surfaces just above the water's surface. Martin's water measurer overwinters in riparian vegetation. Winged forms of Martin's water measurer disperse by flight, but they appear to be uncommon. Wings arise from a recessive genetic trait and are not triggered by environmental conditions. Thus, dispersal between pools might be an issue where this species occurs, but maximum dispersal distances are unknown. This species would benefit from restoration of open water and vernal pool habitats (Applegarth 1995; Taylor 1995; Wood and McPherson 1995; Bennett and Cook 1981; Maier 1977; Hungerford 1919; De la Torre Bueno 1905; Wright 1897). For the purpose of this analysis, Martin's water measurer habitat will be evaluated as the acres of open water. There are currently 17 acres of open water in the planning area.

Mulsant's water treader is a BLM strategic species. It is not documented in Lane County (ORBIC 2010, p. 28). This insect is not suspected to occur in the planning area, but is associated with habitats found in the planning area. Its status is due to habitat loss and to limited distribution and records-of-occurrence in Oregon, possibly an artifact of limited survey. Mulsant's water treader occurs in ponds, on logs or vegetation protruding from the water, on floating vegetation, and on the still or slow-moving surface film of the water. Winged and wingless forms occur together; dispersal occurs by flying between pools. Females deposit eggs by burying them in live vegetation, or in the soft sponge of decaying logs, where those structures protrude from the water's surface. This species passes the winter as adults. This species would benefit from maintenance and restoration of open water and vernal pool habitats (Bishop Museum 2011; Applegarth 1995; Hungerford 1917). For the purpose of this analysis, Mulsant's water treader habitat will be evaluated the same as Martin's water measurer habitat.

Bald Hesperian is a BLM strategic species that is documented to occur in Lane County (ORBIC 2010, p. 27). It has been identified along the east fork of Willow Creek in the planning area and east of Greenhill Road at the entrance of the old Davidson sawmill site. Its status as a strategic species is due to a lack of knowledge. It is uncertain if this species is in significant decline. This species is thought to be associated with herbaceous wetlands, scrub-shrub wetlands or temporary pools. Habitat in the planning area where this snail is located is described as meadows and natural balds. Habitat of the closely related *Vespericola depressus* of the Columbia Gorge is generally described as wet or very moist sites or in dry areas close to springs or seeps. Since the bald Hesperian has rarely been found, habitat associations are general. Sites are in wet or very moist sites. In dry areas, association with a permanent water source such as a spring or seep is almost invariant. This species may be found in association with other snails: Dalles sideband (*Monadenia fidelis minor*) and Columbia Oregonian (*Cryptomastix hendersoni*). This species is present all year, but probably not active under snow in winter. Individuals are entirely terrestrial, but seek refugia where the humidity level is relatively high and temperature is constant, such as deep within cracks in mud, in rock talus or under permanently moist vegetation. This species may travel several hundred feet during a season, only to return to original refuge (Duncan 2009; Applegarth 1995). For the purpose of this analysis, bald Hesperian habitat will be evaluated as two elements:

1) Total habitat - acres of freshwater/riverine, low quality emergent wetlands, high quality emergent wetlands, and high quality wet prairie.
2) Connected habitat - acres of freshwater/riverine, low quality emergent wetlands, high quality emergent wetlands, and high quality wet prairie separated by ≤300 feet (limit analysis to acres of the largest network).

There are currently a total of 148 acres of freshwater/riverine and low quality emergent wetlands, and no acres of high quality emergent wetlands, and high quality wet prairie. There are currently no acres of freshwater/riverine, low quality emergent wetlands, high quality emergent wetlands, and high quality wet prairie separated by ≤300 feet.

How would herbicide use affect soils, water, plants, and animals?

Key Points
• The behavior of herbicides would be influenced by the unique soil properties and topography of the planning area. • Most of the planning area is underlain by a thick, impervious clay with high water-holding and adsorption capacity. • Many of the sites in the planning area have flat topography, limiting the potential for runoff.

The persistence of herbicides in soil and transport to water would be influenced by the characteristics of the soils, topography, and hydrology in the planning area. The potential for off-site movement of herbicides, herbicide degradation and persistence, and effects to soil organisms and soil productivity are complex and intertwined. The geologic history of the planning area has produced soils with atypical properties that would affect the behavior of herbicides in the soil. The soils and hydrology of the planning area have been heavily altered by agriculture, engineered earthmoving activities, construction, and other disturbances. The soils and hydrology of the planning area are discussed in more detail in BLM 2005, pp. 13-16, which is incorporated here by reference.

The Willamette Valley developed from millions of years of deep earth structural geologic movement. However, the surficial landforms come from more recent catastrophic events bringing in completely different lithologies. The planning area is underlain by thick sequences of volcanic and marine sedimentary rock which include the Eugene/Fisher Formations and the Spencer Formation. The south hills, from Willow Creek to Amazon Creek, represent a complex ancient inner sea landscape with nearshore river, braided stream and swamp depositions. The Spencer Formation represents the sediments that eroded off of the coastal Tyee Formation as the continental plate lifted it out of the sea. The non-marine Fisher Formation outcrops along the western side of Oak Hill and represents continental volcanism. All three formations interfinger each other within the planning area. Further to the north, the deeper geologies are overlain by alluvial outwash sediments from the ancient Willamette and McKenzie River drainages.

Approximately 8,000 years ago, multiple Mount Mazama eruptions sent thick ash deposits into the Willamette Valley. Airfall and outwash from the Willamette River inundated the southern Willamette Valley. The ash is widespread and thick in the west Eugene area, including the planning area. This ash deposit formed a gray clay that ranges from one foot to three feet in thickness. In some places, the overlying alluvium is missing, and the gray clay is at the surface. Before the Mazama eruptions, the soils were well-drained. After Mazama, they became perched and poorly drained. Beneath the clay, the buried sediments reflect local geology and are represented with well-drained weathering characteristics. Finally, catastrophic flood events have occurred since the Mazama eruption. Mudflow stratigraphy is found on the valley floor near Fir Butte (James 2008). Other alluvial sequences, including cobbles and gravel, overlay the ash within relict Willamette River channels.

The thick gray clay that underlays most of the planning area is an amorphous gel known as imogolite clay (James and Baitis, 2003). The clay comes from a glassy volcanic ash deposit consisting of amorphous material that lacks crystalline structure. It acts as an impervious surface with large water-holding capacity and creates wetlands during wet months of the year. When saturated, it becomes a gel. When the clay is at or close to the surface, it develops a hummocky topography. This landform develops when the clay dries, shrinks and creates cracks deep into the ground during the dry summer months. During the wet winter months, the clay absorbs water; the cracks swell shut and slide differentially, creating small surface mounds in a polygonal pattern. This hummocky topography contributes to increased plant diversity and plant cover (Logsdon et al. 2012).

The imogolite clay is found only in a few places around the world where more recent rhyolitic volcanos have erupted. With only thousands of years of inundation and burial, the hydrated Mazama ash has developed an extraordinary stickiness with high shrink/swell capacity. The imogolite clay has high anion exchange capacity: that is, the clay is positively charged and attracts and retains negatively charged anions, such as sulfate, phosphate, nitrate, and chloride.

Older volcanic clays, such as the Eugene/Fisher Formations, have had millions of years to weather clays into secondary minerals. They exhibit clays with platy structures, such as smectite and montmorillinite, which are negatively charged and attract and retain positively charged cations, such as calcium, potassium, ammonium, and magnesium. Montmorillonite clay is a layered silicate clay that forms as a secondary mineral, while imogolite is noncrystalline amorphous clay. Imogolite clay possesses many unique chemical and physical properties, including high water-holding capacity and the ability to 'fix' (and make unavailable to plants) large quantities of phosphorus (University of Idaho, 2005). The structure of the imogolite clay makes it a good adsorber of all compounds, including many environmental pollutants such as pesticides.

The planning area has warm summers with very little rain. Most herbicides (although not all) applied for prairie restoration, as proposed in some of the alternatives, would be applied during the dry summer. Warm, sunny conditions at the time of application would result in quick degradation of herbicides that are photodegradable, such as triclopyr.

Although there are some areas where the clay is at or close to the surface, the imogolite clay is capped with an alluvial loam up to 18 inches deep in the majority of the planning area. This covering of loam provides a moisture barrier to the clay. Vegetation continues to grow and microbial activity continues throughout the growing season. Soil microorganisms include bacteria, fungi, algae, nematodes, protozoa, worms, insects, and many other species. Soil productivity is affected by the processes of decomposition, nitrogen fixation, mycorrhizal associates, and soil aggregate formation in tandem with soil organisms. This allows herbicide degradation for those herbicides that are metabolized through soil microbes living primarily in organic matter (e.g., glyphosate and clopyralid).

Where the imogolite clay is at the surface, the clay may play a more important role of adsorbing chemicals, and herbicides may persist longer in the soil. Retention of the herbicides by the imogolite clay would limit leaching. Tight attachment to the clay may increase persistence for those herbicides that readily adsorb, particularly because the soils that are present in the wetlands possess characteristics that are associated with redoximorphic soil conditions (i.e., soil features associated with prolonged wetness, which result from alternating periods of reduction and oxidation of iron and manganese compounds, often resulting in a grey soil color). As soils become saturated during the wet winter, the substrate becomes deficient in oxygen. This is a result of excessive water and depleted soil oxygen levels. Wetlands have anaerobic conditions for weeks and sometimes months of the year. Anaerobic degradation processes are slower than degradation processes in well-drained soils with oxygen present; anaerobic soils conditions would slow the degradation of herbicides that are metabolized through soil microbes.

The effect of herbicide application on soils in this analysis is analyzed using GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) - a root zone model that can be used to examine the fate of chemicals in various types of soils under different meteorological and hydrogeological conditions, as described more fully in Chapter 4 and Appendix D. The GLEAMS model cannot precisely reflect all of the specific soil conditions in the planning area. There is incomplete information about whether the unique properties of the imogolite clay in the planning area would alter the behavior of herbicides in the soil compared to other types of clay. The imogolite clay is unusual in its chemical and physical properties and is rare in occurrence. The GLEAMS model does not have an input option for imogolite clay. This analysis assumes montmorillinite clay as a surrogate for imogolite clay in the GLEAMS modeling of herbicide effects. Montmorillinite clay is the best available surrogate for imogolite clay in the modeling, because it exhibits a similar high shrink/swell capacity, and montmorillinite clays occur locally. However, GLEAMS modeling assuming montmorillinite as a surrogate for imogolite clay may underestimate the mobility or persistence of herbicides in the soil.

In addition, the GLEAMS modeling does not account for the very shallow soils in some parts of the planning area, where the imogolite clay is near or at the surface. The very shallow soils above the imogolite clays may result in the GLEAMS modeling underestimating herbicide persistence, because herbicide degradation in the soil through microbial metabolization would be reduced compared to deeper soil conditions.[9] Nor does the model account for the impermeability of the clay and weeks of standing water in wetland conditions in the planning area. The resultant anaerobic conditions would also reduce microbial metabolization and increase herbicide persistence. Finally, the cracking where the imogolite clay is near the surface could result in piping of water, which may transport sediment and adsorbed herbicides to stream channels, which would not be reflected in the GLEAMS model.

[9] Herbicides are broken down into carbon, hydrogen, oxygen, and other elements through processes such as metabolization, photolysis, and hydrolysis. Herbicide persistence refers to the time the herbicide is not yet broken down by these processes.

Overland flow of water and runoff from sites in the planning area is uncommon, because these areas are engineered to pond and store water throughout the winter, especially those sites with wet prairie plant communities. Autumn rains generally do not cause runoff into streams. Runoff typically occurs only during large, infrequent rain events in the winter. During some years, no large storm events cause surface water tables to reach levels that cause overflows into the streams in the planning area. Most prairie sites in the planning area, especially those closest to waterways, have been contoured to hold ponded water; berms line the waterways to keep surface water from flowing off site. Additional information on the hydrology of the planning area is provided in the West Eugene Wetlands Schedule EA, which is incorporated here by reference (BLM 2005, pp. 14-16).

Streams and rivers in the planning area include Amazon Creek, the Amazon Diversion Channel, Willow Creek, Dead Cow Creek, and the Long Tom River. Dead Cow Creek is typically dry throughout the summer months. Amazon Creek, the Amazon Diversion Channel, Willow Creek experience very low flow during summer months. Below the Turtle Swale site, Amazon Creek and the Amazon Diversion Channel have weirs, which regulate the amount of water flowing into Fern Ridge Dam. Amazon Creek, the Amazon Diversion Channel, and Willow Creek are largely unshaded in the planning area, and summer water temperatures are high. The Long Tom River near sites in the planning area lies below the Fern Ridge Dam. There are two other small creeks on the South Taylor site: a Long Tom River side channel and Coyote Creek. Both have very low, shallow flow and are shaded.

How would prescribed burning affect air quality?

Key Points
• The planning area is within a non-attainment area for air quality. • Prescribed burning in the planning area is often precluded because of air quality conditions.

The U.S. Environmental Protection Agency "Interim Air Quality Policy on Wildland and Prescribed Fires" discusses the potential effects of prescribed burning on air quality and the important analytical parameters. That discussion identifies that primary indicators of public health impacts from prescribed burning are ambient air quality impacts above the National Ambient Air Quality Standards for fine particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$), and particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}). Emissions of nitrogen oxides (NO_x), volatile organic compounds, and carbon monoxide (CO) from fires can also impact the National Ambient Air Quality Standards. However, the actions required to reduce volatile organic compounds and CO emissions are the same as those recommended to mitigate impacts on the $PM_{2.5}$ and PM_{10} National Ambient Air Quality Standards. Emissions of NO_x, on the other hand, can increase under some of the burning conditions used to decrease emissions of other pollutants. That discussion is incorporated here by reference (EPA 1998, pp. 3-7).

The planning area is within a Smoke Sensitive Receptor Area, designated by Oregon Administration Rules as an area that receives the highest level of protection under the smoke management plan because of its past history of smoke intrusions. When prescribed burning is conducted inside a Smoke Sensitive Receptor Area, 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. The Smoke Sensitive Receptor Areas in western Oregon are described in detail in the Final Environmental Impact Statement for the Revision of Western Oregon RMPs (BLM 2008, pp. 408-410), which is incorporated here by reference.

The Eugene-Springfield Urban Growth Area, which includes portions of the planning area, is a non-attainment area for CO and PM_{10}. A non-attainment area is a geographic area that has not consistently met the clean air levels set by the U.S. Environmental Protection Agency in the National Ambient Air Quality Standards, described in the Oregon Administrative Rules, Chapter 340, Division 204-0010 (Available online at http://www.deq.state.or.us/aq/planning/nonattainment.htm; accessed May 2012). Air quality in the planning area has been improving over the past decade. Air concentrations of $PM_{2.5}$, PM_{10}, 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 (LRAPA 2011). The Lane Regional Air Protection Agency reported that, using 1985-1987 as a baseline, the air pollution levels in Eugene-Springfield during 2008-2010 were:

- 65% lower PM_{10} on worst winter days and 60% lower PM_{10} as an annual average;

- 25% lower ozone on hot summer afternoons; and
- 80% lower CO in the area of highest traffic congestion (LRAPA 2011).

The BLM has been conducted an average of 80 acres per year of prescribed burning in the planning area over the past six years. The annual acreage of prescribed burning had varied widely from year to year, in large part because of weather conditions and restrictions on burning to protect air quality. In many years, wildlfires in the Cascades Mountains have effects on regional air quality that limit the opportunities for prescribed burning in the planning area. Wildfires in the Cascade Mountains are most common during east-wind events, which are typically also the most favorable conditions for prescribed burning in the planning area. As a result, prescribed burning in the planning area is often precluded until late September because of air quality conditions. The average acreage of prescribed burning in the planning area has been less than the BLM would implement under existing management decisions if not for air quality restrictions on burning.

How would changing climate conditions alter the effect of BLM management actions on resources?

Key Points
• The planning area has been getting warmer, although the magnitude of warming is less than other locations in the region and less than predicted future warming. • Annual precipitation in the planning area has not shown a changing trend, though there have been slight changes in seasonal precipitation.

The climate in the planning area is relatively mild throughout the year, with cool, wet winters and warm, dry summers. The regional climate and trends in regional temperature and precipitation are described in more detail in the U.S. Fish and Wildlife Service Willamette Valley National Wildlife Refuges Draft Comprehensive Conservation Plan (USFWS 2011b, pp. 3-3 - 3-8), which is incorporated here by reference. That analysis summarized that, at the regional scale, temperatures have generally increased over the last 100 years, and warming trends generally have been strongest in the winter months. Regional precipitation trend data shows a moderate increase over the last 100 years. Projections for future climate trends in the region predict a continuing increase in temperature and annual precipitation to remain within the range of natural variability, though with modest increases in winter precipitation and modest decreases in summer precipitation.

Weather records within the planning area show climate trends similar to the regional trends and generally consistent with the predictions for future climate changes, with some slight differences. The planning area is getting warmer: the highest average monthly temperature for each year and the lowest average monthly temperature for each year both show a slight increasing trend over the last 116 years (Figure 10)(PRISM 2012). Although this trend is consistent with regional trends and predictions for future climate changes, the magnitude of the warming trend in the planning area is smaller than most other locations in the region and smaller than the predictions for future climate changes (Mote et al. 2010, pp. 17-22; Lawler et al. 2008, pp. 9-13).

Annual precipitation in the planning area has not shown a changing trend over the past 116 years (Figure 11). Unlike trends in temperature, the regional trends in precipitation are weak and inconsistent (Lawler et al. 2008, p. 13-16). Regional climate models do not show clear trends for future changes in annual precipitation (Mote et al. 2010, p. 21).

Figure 10. Highest average monthly temperature and lowest average monthly temperature by year

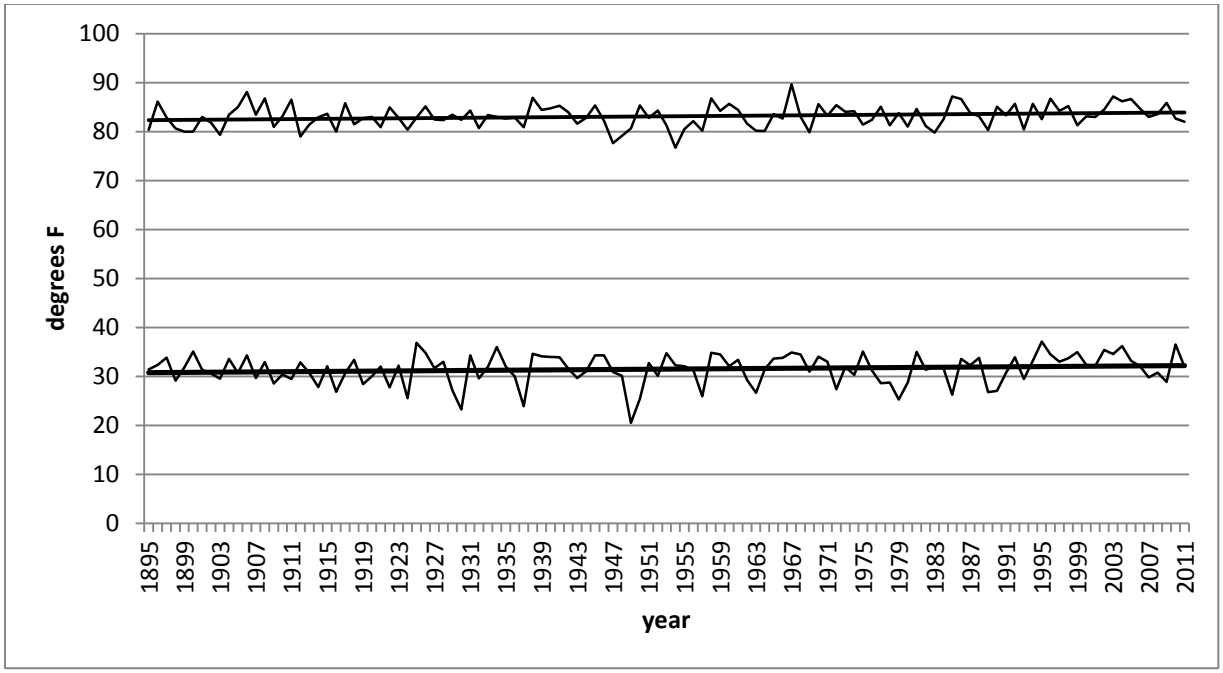
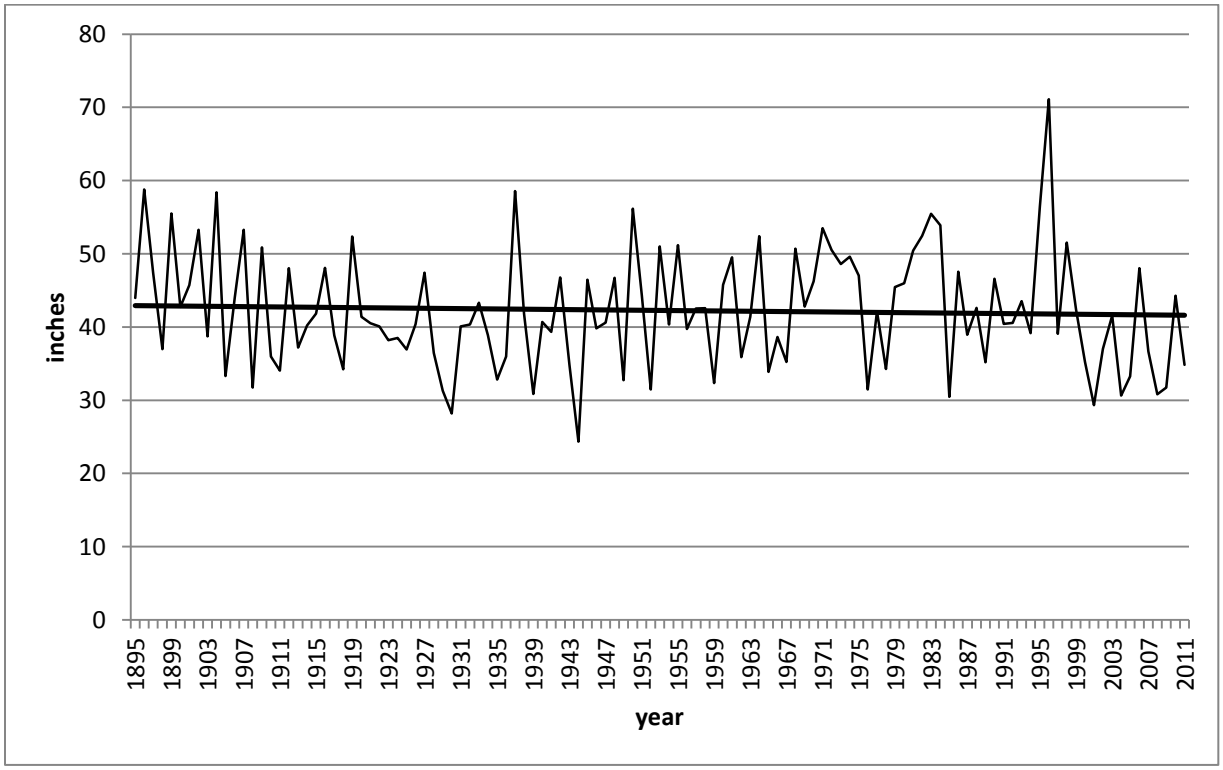


Figure 11. Annual precipitation by year



Summer precipitation (July, August, September) has shown a slight decrease (Figure 12); autumn precipitation (October, November, December) has shown no changing trend (Figure 13); winter precipitation (January, February, March) has shown a slight decrease (Figure 14); and spring precipitation (April, May, June) has shown a slight increase (Figure 15). The observed decreasing trend of winter precipitation is not consistent with projections for future trends (Mote et al. 2010, pp. 22, 25; Lawler et al. 2008, p.20). However, predictions for future changes in precipitation are far more uncertain than predictions about future changes in temperature (Mote et al. 2010; Lawler et al. 2008).

Figure 12. Summer precipitation by year

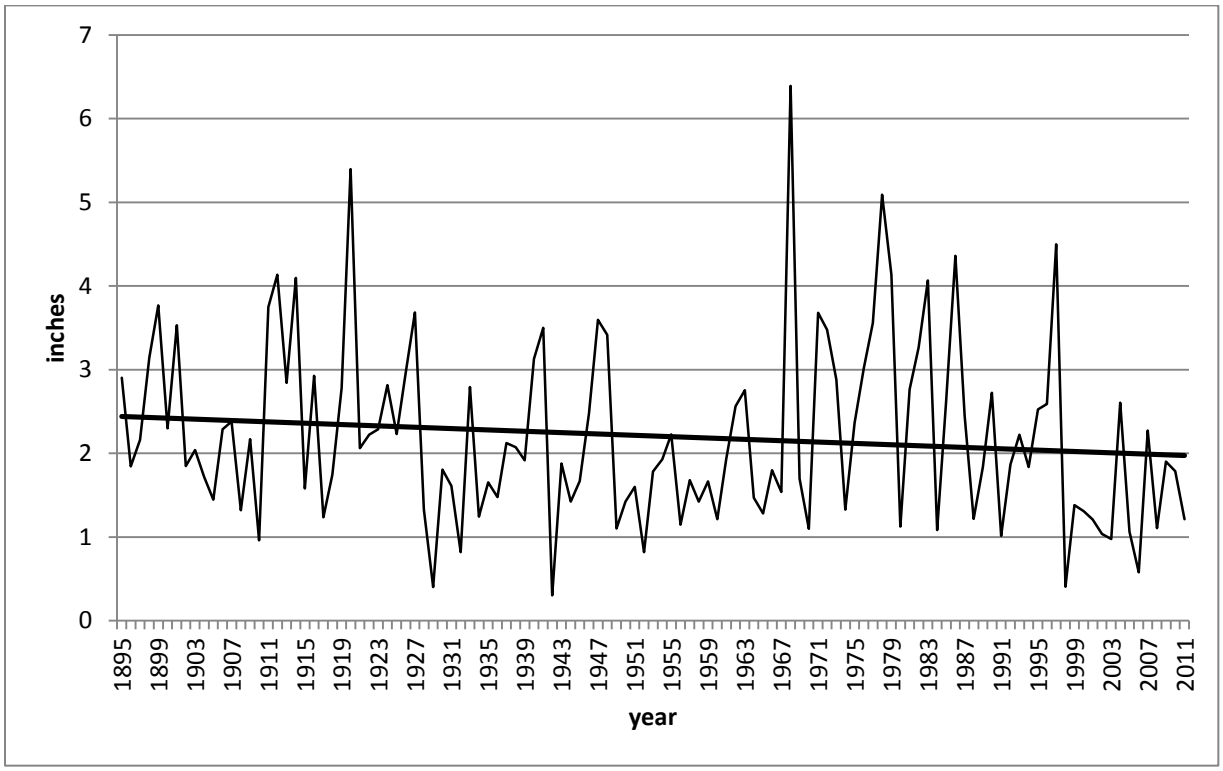


Figure 13. Autumn precipitation by year

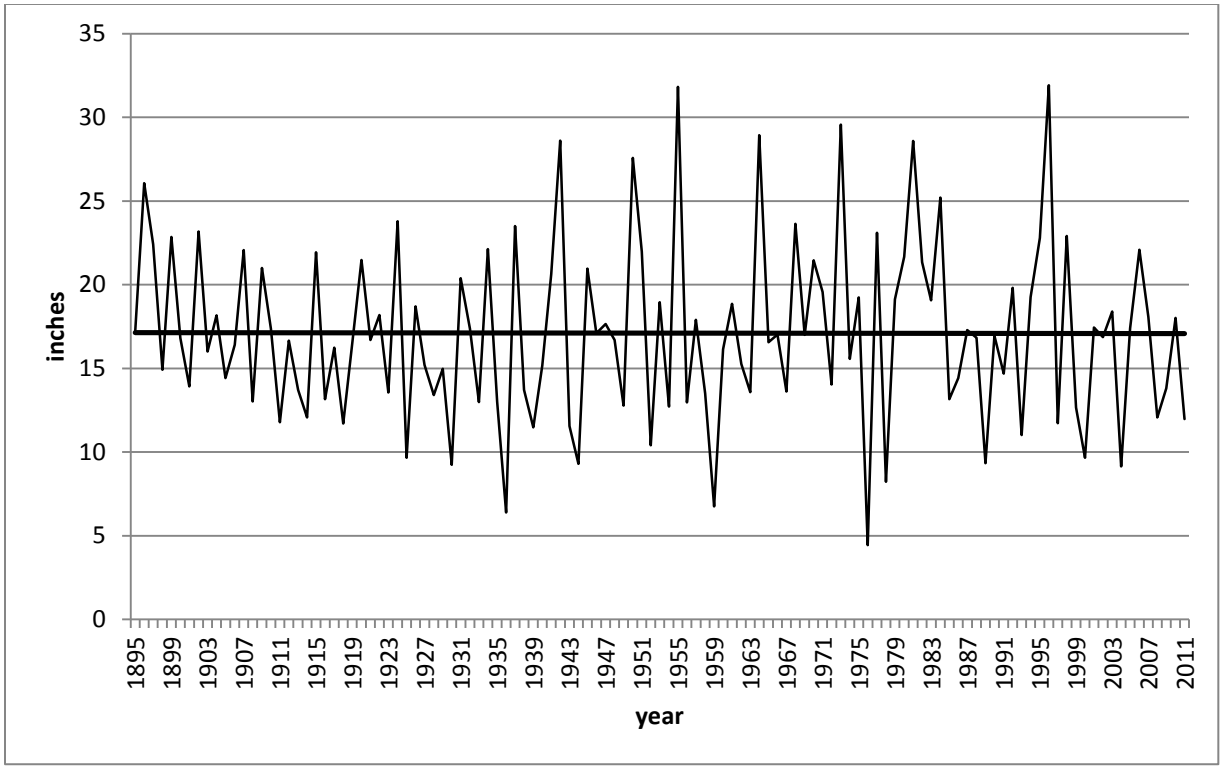


Figure 14. Winter precipitation by year

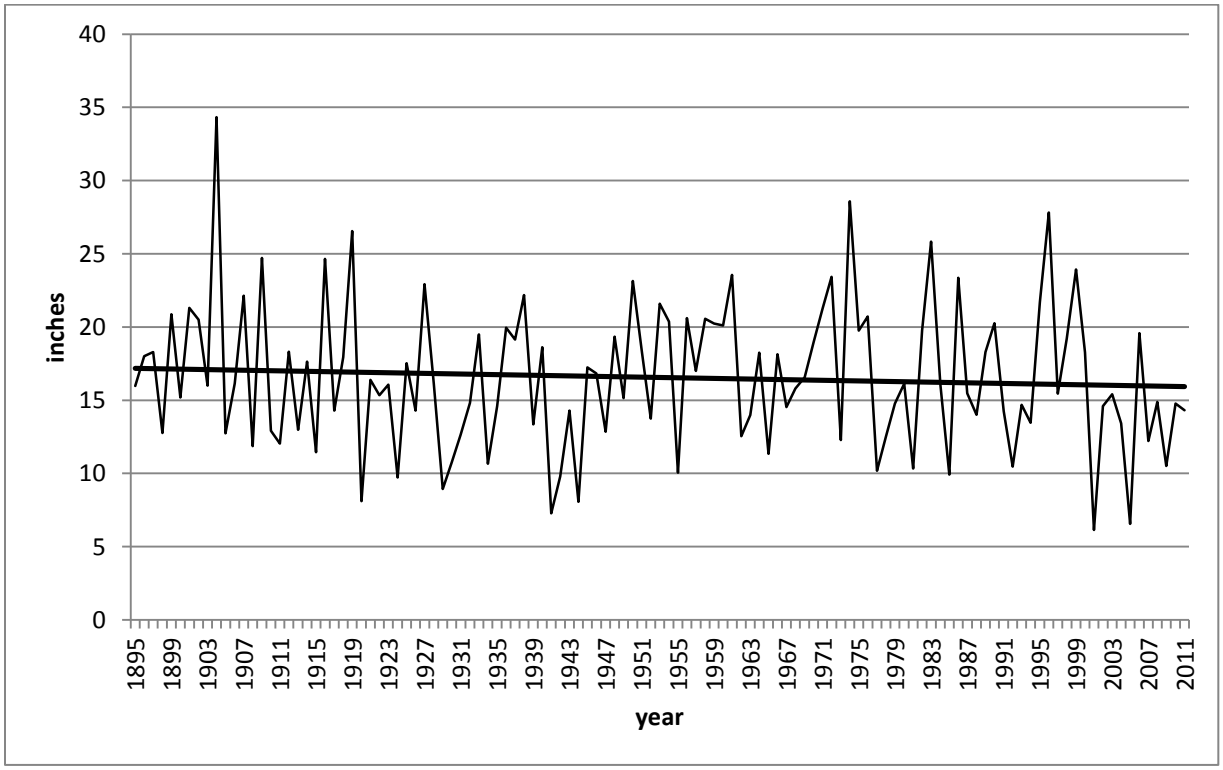
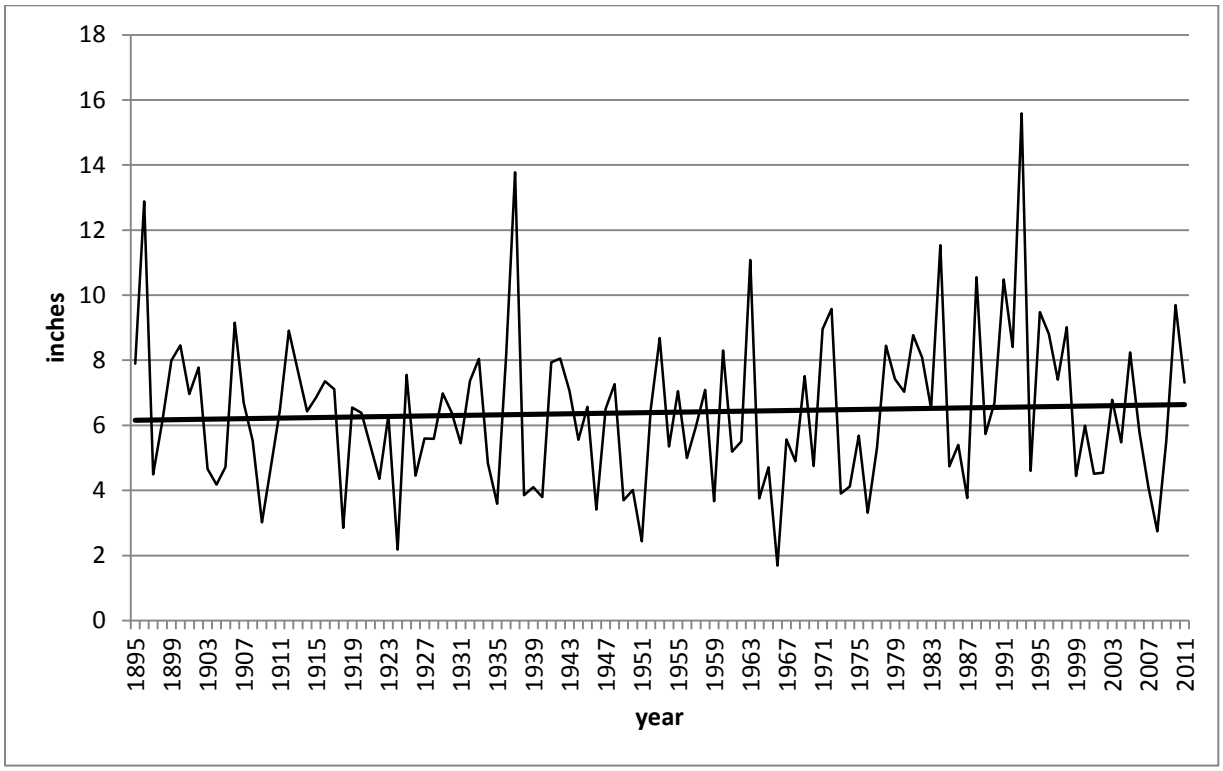


Figure 15. Spring precipitation by year



Changes in climate alter the geographic distribution of plant and animal species. However, there is incomplete and unavailable information needed to assess how species are responding to recent changes in climate and predict how species will respond to future changes in climate. Shafer et al. summarized the areas of uncertainty related to analyzing the effect of climate changes on plant species. As described above, there are important uncertainties about predictions of future climate. In addition, plant species respond individualistically to climate change; there is little information for most plant species on their sensitivities to climate change; and there are uncertainties about the interaction of climate change and plant diseases and insect pests. That discussion is incorporated here by reference (Shafer et al. 2010, pp. 173-174; 193-194).

Steel et al. evaluated species vulnerability to climate change in the Willamette Valley. That assessment concluded that invertebrates, fishes, and plants tended to be the most vulnerable groups on average. The ecological parameters that most contributed to climate change sensitivity were inferred limitations in temperature tolerance, negative response to disturbance regimes, dependence on current precipitation/hydrologic regimes, dependence on specific habitat attributes, and dependence on cooler microsites within habitats. That assessment is incorporated here by reference (Steel et al. undated, pp. 33-51).

How would BLM management actions affect greenhouse gas emissions and carbon storage?

Key Points
• There is little information on carbon storage in Willamette Valley prairies. • Current carbon storage in the planning area represents less than 0.005% of current carbon storage on BLM-administered lands in western Oregon.

Ecosystems store carbon, which affects atmospheric concentration of carbon dioxide, and thereby affects global climate. The Final Environmental Impact Statement for the Revision of Western Oregon RMPs explored the role of ecosystems in carbon storage, described greenhouse gas emissions related to land management, and identified areas of uncertainty related to estimating ecosystem carbon storage. That analysis is incorporated here by reference (BLM 2008a, pp. 220-224).

Changes in greenhouse gas levels affect global climate. Forster et al. 2007 (pp. 129-234), which is incorporated here by reference, reviewed scientific information on greenhouse gas emissions and climate change and concluded that human-caused increases in greenhouse gas emissions are extremely likely to have exerted a substantial warming effect on global climate. The U.S. Geological Survey, in a memorandum to the U.S. Fish and Wildlife Service, summarized the latest science on greenhouse gas emissions and concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location (US Geological Survey, 2008). That memorandum is incorporated here by reference.

It is not possible to describe precisely and accurately the total storage of carbon in ecosystems in the planning area, because there is incomplete and unavailable information on the current inventory of carbon storage and the effect of habitat management treatments on carbon storage. Carbon inventories for Willamette Valley prairie ecosystems are not available. Carbon inventories for midwestern prairies are unlikely to be relevant to Willamette Valley prairies and particularly inapplicable to the planning area. Midwestern prairies typically have deep soils, allowing for large accumulations of carbon in the soil; most of the planning area has very shallow soil above an impervious clay layer, limiting soil development, plant rooting, and soil carbon accumulation. In the absence of site-specific or regionally-specific data, this analysis will approximate the current condition of carbon storage using some broad generalizations and assumptions that are consistent with current theoretical approaches. Using carbon estimates from Brown et al. 2004 (pp. 16-17), this analysis assumes carbon storage rates for the plant communities in the planning area as follows: 1 tonne[10]/acre in wet prairie and upland

[10] Note: this analysis measures carbon storage in tonnes (also known as metric tons), which are equal to approximately 2,205 pounds, because most scientific literature on carbon storage reports carbon amounts in these

prairie; 40 tonnes/acres in oak savanna; 60 tonnes/acre in oak woodland and ash swale/riparian; and 100 tonnes/acre in Douglas-fir forest and plantation.

Current carbon storage in the planning area is approximately 20,000 tonnes, which is the equivalent of approximately 75,000 tonnes of carbon dioxide. This represents less than 0.005% of current carbon storage on BLM-administered lands in western Oregon (BLM 2008a, pp. 224, 538).

Current management of the planning area results in greenhouse gas emissions from prescribed burning and diesel and gasoline consumption by machinery. Prescribed burning emits several greenhouse gases, including carbon dioxide, methane, and nitrogen oxides. Greenhouse gas emissions are typically measured in carbon dioxide equivalents: the amount of carbon dioxide that would have the same global warming potential, when measured over a specified timescale (typically 100 years). Methane has a global warming potential 25 times that of carbon dioxide; nitrogen oxides have a global warming potential 298 times that of carbon dioxide.

As described in the issue related to air quality above, the acreage of prescribed burning in the planning area has varied widely from year to year in the recent past. The average amount of prescribed burning results in the emission of approximately 1,000 tonnes per year of carbon dioxide equivalent. Fuel consumption by machinery for current management in the planning area emits approximately 1 tonne per year of carbon dioxide equivalent, which is immeasurably small given that this analysis rounds carbon storage estimates to the nearest 1,000 tonnes.

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units. Estimates of carbon storage in this analysis will be rounded to the nearest 1,000 tonnes. Given the multiple sources of error in estimating ecosystem carbon storage, more precise estimates would not reflect the accuracy of the estimates.

How would BLM management actions affect archaeological, historical and traditional use resources (trust responsibilities)?

Key Points
• Cultural resources include archaeological, historical, and traditional use sites. • No definitive archaeological or historical sites have been found in the planning area, but surveys are incomplete. • Camas, tarweed, rushes, willow, and hazel are traditional use plants in the planning area that may be collected by local Native American tribes.

Cultural resources refer broadly to the locations and materials contained within archaeological, historical or traditional use sites. Cultural resources most often consist of physical remains, but may also be identified solely through oral or written sources. Cultural resources that meet the criteria for eligibility to the National Register of Historic Places are defined as historic properties, and as such are subject to the provisions of the National Historic Preservation Act.

Archaeological sites are locations on the landscape that contain the physical remains of past human activities. They are often partially or entirely buried and contain artifacts or features that represent the activities or life ways of past people. Archaeological sites relating to native peoples in the area may contain artifacts such as stone or bone tools, shell or glass jewelry, and features such as fire hearths, camas oven, or the remains of a house such as a post-hole or a pit type depression representing the floor of a home.

Historic sites are those that relate to the historic period and generally represent Euro-American occupation in the region. Historic artifacts can consist of bottles, cans, tools, coins, bullets and multitude of other items that represent past living habits. Historic features or structures can consist of buildings, trails, cemeteries, forts and a variety of other things.

Traditional use sites are identified by local Native American tribes as being important to those living communities' historically rooted practices, customs and beliefs. These sites include areas that are known gathering sites for any cultural purpose, including food, medicinal plants, and traditional tool materials. They can also be identified as places that have significance in oral traditions, are spiritual locations, sacred sites or historically important to the tribe.

Analysis of effects on these resources contributes to the BLM fulfilling the government's trust responsibilities to the tribes.

Cultural Setting

Prior to Euro-American trappers and explorers entering western Oregon, the Willamette Valley was occupied by the Kalapuya Indians. They lived along the valley floor and nearby foothills throughout the

upper Willamette Valley into a portion of the Umpqua River basin. The Kalapuya were comprised of numerous bands, or small autonomous groups. The Chelamela is one of these bands that lived in the Long Tom River area, including the planning area.

The Kalapuya traditionally subsisted on both plant and animal resources available within the valley and the neighboring foothills and uplands. The rich variety of resources within these different locales meant that the Kalapuyans typically moved seasonally according to the availability of desired plant and animal resources. Plant foods made up a majority of the Kalapuyan diet, with camas being the staple. Other important plants to their diet included tarweed, cattail, hazelnuts, lupine, acorns, and a variety of berries. Deer, elk, and black bear were hunted, along with other smaller mammals, birds, and some fish (Beckham et al. 1981; Minor et al. 1980; Zenk 1990).

In January 1855, the Willamette Treaty was signed by bands of the Chinook, the Molalla, and the Kalapuya of the Willamette Valley and adjacent area of the lower Columbia. The bands confederated under the Treaty and ceded the territory described therein. Other treaties were signed in western Oregon around the same time, including the Treaty with the Rogue River of 1853 and 1854, Treaty with the Umpqua of 1853, Treaty with the Umpqua and Kalapuya of 1854, and the Treaty with the Chasta of 1854.

The Coast (Siletz) Reservation was created on November 9, 1855 for the "Coast, Willamette and Umpqua Tribes" by order of President Pierce. On November 12, 1855, it became federal policy for the Tribes to be removed to the Coast Reservation, under the 1853 and 1854 Rogue River Treaties and the 1854 Chasta, Scoton and Grave Creek Treaty. A staging area "encampment" was set up on the South fork of the Yamhill River for Tribes being removed to Siletz until the improvements could be built at Siletz Agency and the Tribes could move to the reservation. In June 1857, instead of adding the encampment to the Siletz reservation, it was created as the Grand Ronde Reservation. Most Willamette Treaty people moved to the encampment and stayed at Grand Ronde when it was made a permanent reservation. However, some did stay behind, and a few moved to the original place designated for them at the Siletz reservation.

The Willamette Valley became a popular place for Euro-Americans to settle starting in the 1840's. The fertile soil and temperate climate of the valley attracted settlers, and, within a century, the population of Lane County reached 60,000 people. The 1862 Homestead Act provided families with the opportunity to settle and work prime farmlands. Construction of the Oregon and California Railroad between Eugene and Portland in 1871 set the area as a hub for agriculture and other industries, such as logging, which soon became the prevailing economic provider in the area (Beckham et al. 1981).

Cultural Resources within the Planning Area

One-third of the planning area has been inventoried for cultural resources. Three cultural resource inventories have been conducted on portions of the planning area since the BLM began acquiring the lands. The lack of cultural resource inventories conducted on the BLM-administered lands directly correlates with the paucity of recorded archaeological and historical sites. No definitive archaeological

or historical sites were discovered in two of the three surveys. One survey did locate a few flakes of chert during sub-surface probing but is not enough material to constitute a site (Oetting 1995). Ten isolated finds were identified during the 2007 inventory, including various historic farm machinery and rock features that were tentatively identified as camas ovens (Wernz 2007). Since none of them could be definitively identified as archaeological or historical, they were not formally documented as such. Cultural resource inventories conducted in the vicinity of the planning area, including the Fern Ridge Reservoir, Long Tom River drainage, and other areas within the planning area boundary not managed by the BLM, have discovered numerous archaeological and historical sites. The archaeological sites are mostly comprised of clusters or scatters of fire-cracked rock; these could likely be from past fire hearths or camas ovens that have since eroded, displacing the rock. Other materials commonly identified are scatters of flaked obsidian, chert, and basalt; projectile points; ground stone tools and fragments; middens of charcoal, flaked stone tools and fragments, ground stone and a variety of other materials (Musil 2005; Toepel 1985).

Traditional use resources identified in the planning area are primarily plant materials. During outreach efforts to local tribes, the Confederated Tribes of Grand Ronde responded with interest in the planning area. Descendants of the Kalapuya comprise a portion of the tribal membership of the Confederated Tribes of Grand Ronde. Representatives of the Grand Ronde have identified a variety of plants as culturally significant to the tribe. Currently there is not active or regular gathering of plant materials by tribal members within the planning area, but they have expressed interest in being involved with the BLM and creating and/or maintaining areas for traditional plant gathering.

Discussions surrounding tribal use of the planning area for gathering have initially focused on five plants identified by the Grand Ronde as having cultural significance and potential gathering interest and known to exist in the planning area: camas (*Camassia* spp.), rush (*Juncus* spp.), tarweed (*Madia* spp.), willow (*Salix* spp.), and hazel (*Corylus cornuta*) (D. Harrelson, The Confederated Tribes of Grand Ronde, *personal communication,* March 30, 2012). Ten parcels in the planning area contain at least one of these species, and four of the parcels contain at least two of the species.

The BLM does not consider the current camas population in the planning area to be large enough to warrant regular gathering (S. Villegas-Moore, BLM, *personal communication*, February 23, 2012). Camas is a nectar species for Fender's blue butterfly, and the BLM is not currently meeting recovery goals for nectar species for Fender's blue butterfly. If new populations of camas are developed or current populations are augmented, regular gathering of camas in the future may be possible. Both tarweed and rush have sizable populations that could support limited gathering, but would need to be monitored. Both hazel and willow have large populations within the planning area and could be opened to gathering. However, these plants need more active management to produce desirable material for gathering. Additionally, certain species of these plants are desired over others for gathering. Pacific willow (*Salix lasiandra*) is the preferred species used for weaving materials. *Camassia quamash* is the preferred camas species for bulb collection, and *Juncus effusus* is the preferred rush used in weaving (D. Harrelson, The Confederated Tribes of Grand Ronde, *personal communication,* March 30, 2012).

Access to sites affects the potential for traditional use plant gathering. Locations for gathering should be readily accessible so that tribal elders are able to easily participate in gathering. Parking, walking distance, and access via public lands are important factors to consider when determining potential for traditional use plant gathering.

How would BLM management actions affect access to the planning area, authorizations over the planning area, and authorizations for extractive uses in the planning area?

Key Points
• All sites in the planning area have legal public access, except for Long Tom, North Taylor, and South Taylor. • Almost all of the planning area is closed to locatable minerals.

Lands and Realty

There are existing right-of-way authorizations in the planning area, as shown in Appendix B. The BLM recognizes those existing rights-of-way, permits, and easements as valid uses. The BLM has received very few right-of-way applications in the planning area in the past decade.

There are no existing communication sites in the planning area.

The BLM has designated no corridors for pipelines or transmission lines in the planning area.

There are no withdrawals in the planning area: withdrawals generally segregate land from operations under the nondiscretionary general land laws, mining laws, and sometimes the mineral leasing laws, but do not always affect BLM surface management.

There are no classifications in the planning area: classifications generally segregate the lands from all forms of appropriation under the public land laws, including the mining laws, but not the mineral leasing laws.

All parcels in the planning area have legal public access, except for Long Tom, North Taylor, and South Taylor. However, legal public access does not assure convenient physical access. Many of the parcels are accessible only on foot, which may be especially difficult in winter.

Minerals and Energy

Geological and mineral potential information comes from the Mineral Potential of Lands within the West Eugene Wetlands Project Report (BLM 1992), which is incorporated here by reference. The planning area is located within the southern Willamette Valley, which extends from the Salem Hills to a point south of Cottage Grove where the Coast Range and Cascade Range converge. The valley is a structural depression with hills of moderate relief in places that separate broad alluvial flats.

The oldest geologic formations in the southern Willamette Valley date back to 65 to 56 million years ago. At that time, the Coast Range and most of the Willamette Valley was a very large and partially

enclosed basin. A chain of volcanic peaks may have existed west of the planning area, well offshore, and deposited vast amounts of marine sediments into the valley prior to the uplifting of the Coast Range. To the east of the Willamette Valley was the volcanic activity of the Cascade Range, which resulted in the mineralized areas of the Blue River and Bohemia mining districts.

Locally, the oldest formations near the planning area are the Fisher and Eugene Formations, both deposited between 34 and 23 million years ago. The Fisher Formation consists of about 7,000 feet of clastic material, which is material made up of fragments of pre-existing rocks. The marine Eugene formation is composed of coarse to fine sandstone. Most of the lands within the planning area are deposits of silt, sand and gravel, mapped as alluvium which was deposited during recent times by the Willamette River and its tributaries.

There are no split estates located within the planning area. The BLM manages the subsurface of all BLM-administered lands in the planning area. The BLM does not have subsurface rights to any privately owned parcels within the planning area boundary, including the parcels over which BLM has a conservation easement.

The BLM categorizes minerals as locatable, leasable, or saleable. Locatable minerals are minerals for which mining claims can be located under the General Mining Act of 1872, as amended. Locatable minerals include precious and base metals and some non-metallic minerals. Leasable minerals include oil, gas, and geothermal and some solid mineral resources such as coal and oil shale. Saleable minerals include common variety mineral materials such as sand, gravel, rock, clay, and cinders. The distribution of mineral resources is described below.

The potential for the occurrence of locatable minerals in the planning area is low. The Eugene District Mineral Resources Inventory does not show any indication of known or prospective locatable mineral occurrences in the planning area. The geology does not appear favorable for the occurrences of locatable minerals. However, there is a slight chance that such minerals could occur either in the alluvium or underlying bedrock formations within the area. There are no existing mining operations for locatable minerals within the planning area boundary; no mining claims in the planning area; and there has been no exploration for locatable minerals in the planning area. Almost all of the planning area is closed to locatable minerals. Acquired lands are not open to locatable minerals unless specifically opened by the BLM and the Department of the Interior. Two parcels of acquired lands in the planning area, Stewart Pond and Eastern Gateway, were opened under BLM-initiated opening orders after they were acquired. However, these two parcels are within the city limits of Eugene, which prohibits mining in the planning zones and wetland buffers in which these parcels are located (T. Taylor, City of Eugene, *personal communication,* April 24, 2012). The only portions of the planning area that are open to locatable minerals are the survey hiatuses outside of the city limits: Long Tom and the thin strip connecting North Taylor and South Taylor. These survey hiatuses have the land status of public domain lands, and therefore are open to locatable minerals under the authority of the General Mining Act of 1872 unless specifically withdrawn, which has not been done for these parcels.

The planning area is considered to have moderate potential for the leasable minerals of oil and gas and low potential for the occurrence of leasable minerals other than oil and gas. There are no existing developments of leasable minerals within the planning area boundary; no leases in the planning area; and there has been no exploration for leasable minerals in the planning area.

The planning area is considered to have moderate potential for the saleable minerals, such as sand, gravel, and clay. The clay in the planning area may have potential for commercial development, although there has not been any exploration or development within the planning area.

How would BLM management actions affect recreation opportunities?

Key Points
• The landscape of the planning area is highly modified and has a mostly urban or rural setting. • The planning area currently provides recreation opportunities for bicycling, hiking, bird watching, and educational activities. The Fern Ridge Path through the planning area receives consistently heavy bicycle and pedestrian use.

Most of the planning area is highly developed and has an urban or rural setting. At most sites, the character of the natural landscape has been considerably or entirely modified, and the evidence of human use is constant and pervasive. The few sites within the planning area that have a largely natural appearing setting or any opportunities for remoteness lack legal public access (Table 13).

Restrictions under the Final Supplementary Rules for Public Land within the West Eugene Wetlands guide and direct recreation uses in the planning area. Under the supplementary rules, the entire planning area is currently closed to any overnight use, except traveling on the Fern Ridge Path. In addition, the planning area is closed to any motorized vehicle use except on roads or paths or parking areas specifically designated for vehicle use. The planning area, with the exception of the Fern Ridge Path, is closed to any non-motorized vehicle use except on roads or paths or parking areas specifically designated for vehicle use (Federal Register, Vol. 70, No. 144, Thursday, July 28, 2005, 43713 – 43715). The urban sites, especially Eastern Gateway and Stewart Pond, continue to experience a range of unauthorized uses.

Recreation opportunities in the Long Tom, North Taylor, and South Taylor sites are restricted by the lack of legal public access.

The planning area currently provides recreation opportunities for bicycling, hiking, bird watching, and educational activities. The recreation developments in the planning area include the Fern Ridge Path, trails, boardwalks, wildlife viewing platforms, parking areas, and picnic tables.

The Fern Ridge Path through the planning area receives consistently heavy bicycle and pedestrian use. The paved path was constructed following the grant of a right-of-way to authorize the City of Eugene to construct, operate, and maintain a bicycle/pedestrian path across BLM-administered lands. The path crosses multiple ownerships in both urban and rural settings. As a result of the heavy use and the highly developed nature of the setting, the Fern Ridge Path experiences considerable litter and vandalism.

The half-mile Tsanchiifin Walk trail on the Balbao site is named after the local band of Kalapuya Indians that lived in this area. From the west side of Danebo Avenue, the trail branches off to the north from the Fern Ridge Path.

The Stewart Pond site has a parking area off of Stewart Road, trails, and wildlife viewing areas, especially for viewing waterfowl. The Eastern Gateway site has a trail and a wildlife viewing platform. The Stewart Pond and Eastern Gateway sites are located in an urban setting and experience litter and vandalism, as well as unauthorized uses such as camping.

The West Eugene Wetland Project Office is located on the Danebo site. This house was converted into an office for BLM's wetland project staff and partners. The Danebo site includes picnic tables and a boardwalk over restored wetlands.

Table 13. Recreation setting criteria

Attribute	Setting		
	Front Country	**Rural**	**Urban**
Acreage	320	720	300
Sites within the planning area	Long Tom North Taylor South Taylor	Hansen Fir Butte Oak Hill Greenhill Turtle Swale Nielson Larson Spectra Physics Vinci Oxbow East Oxbow West Summer Oaks	Eastern Gateway Stewart Pond Burley Nolan Willow Corner Annex Speedway Willow Creek Confluence Isabelle Danebo Beaver Run Rosy Balboa
Remoteness	Within ½ mile of some access road, including unpaved roads and private roads	Within ½ mile of at least one paved City or County road	Within ½ mile of multiple paved City or County roads
Naturalness	Character of the natural landscape partially modified but none overpower natural landscape (e.g. roads, structures, utilities)	Character of the natural landscape considerably modified (agriculture, residential or industrial)	Urbanized developments dominate landscape
Physical appearance	Generally natural appearing environment with moderate human evidence	Substantially modified appearance; human sights and sounds clearly evident	Substantially urbanized environment; sights and sounds on-site are common
Evidence of use	Occasional evidence of resource use and development	Notable evidence of development and pavement	Pervasive evidence of development and pavement; unavoidable litter
Access	No legal public access	Paved roads within ½ mile	Paved roads adjacent to or nearly adjacent to site
Contacts	Not applicable – no legal public access	People can been seen everywhere, but contact is intermittent	Other people constantly in view

How much would it cost to implement the alternatives?

Key Points
• The average annual budget for BLM administration of the planning area has been approximately $500,000, with an average of $170,000 spent on habitat management.

The recent budget for BLM administration of the planning area includes funding for habitat management treatments, resource inventories, resource monitoring, staff, overhead, maintenance of recreation trails, and facility maintenance. The total budget for BLM administration of the planning area has averaged approximately $500,000 per year. Total budget has varied widely over the past seven years, ranging from $372,000 to $510,000 per year. The budget for management in the planning area is derived from multiple funding sources, some of which change from year to year. Therefore, it is not possible to precisely and accurately segregate the portion of the total budget that is spent on habitat management treatments. An approximation of the portion of the total budget can be derived based on the funding cost codes. However, this approach may not account fully for staff time, inventories, and overhead necessary for implementing habitat management, and may count some funding that is devoted to non-habitat management projects. Based on this approximation of the recent funding for habitat management in the planning area, the variation in funding for habitat management over the past seven years has been less than the variation in the total budget. The BLM has spent from $113,000 to $187,000 per year on habitat management in the planning area, with an average of approximately $170,000 per year.

Chapter 4 - Environmental Consequences

Introduction

This chapter describes the environmental consequences of the alternatives. As explained in Chapter 1, environmental impact statements prepared for RMPs typically discuss all resource programs and analyze in detail impacts to all resources present. This RMP has a narrower focus than most RMPs, and many resources and programs do not need detailed analysis in this RMP/EIS. The presentation of environmental consequences is organized by the issues identified for detailed analysis:

- How would BLM management actions affect the restoration of native plant communities?
- How would BLM management actions contribute to meeting the recovery objectives described in the recovery plan for ESA-listed species?
- How would BLM management actions affect BLM sensitive and strategic plant and animal species?
- How would herbicide use affect soil, water, plants, and animals?
- How would prescribed burning affect air quality?
- How would changing climate conditions alter the effect of BLM management actions on resources?
- How would BLM management actions affect greenhouse gas emissions and carbon storage?
- How would BLM management actions effect archaeological, historical and traditional use resources (trust responsibilities)?
- How would BLM management actions affect access to the planning area, authorizations over the planning area, and authorizations for extractive uses in the planning area?
- How would BLM management actions affect recreation opportunities?
- How much would it cost to implement the alternatives?

The geographic scope of the analyses varies by issue as described for each issue. For example, the analysis of effects on threatened and endangered species has a geographic scope of the recovery zone for each species. The analyses reference the planning area, which is the BLM-administered lands within which this RMP will make decision. Some analyses also reference the planning area boundary, which is the broader geographic area surrounding the planning area, including all land ownerships (see Map 1). The temporal scope of the analyses, unless otherwise stated below, is ten years. Many of the effects of the alternatives on resources are tied to the changes in plant communities described in the first issue. The changes to plant communities from the alternatives would occur within ten years and then stabilize in that condition. Therefore, attendant changes to resources tied to these plant communities, such as plant and animal habitat, would also occur within ten years and then stabilize in that condition with continued maintenance.

For all alternatives, this analysis assumes adequate funding, staffing, and supplies (such as seeds and plugs for plant augmentation) to implement the actions under each alternative. Furthermore, the analysis assumes that administrative restrictions would not preclude implementation (e.g., air quality

restrictions would not preclude the ability to implement the extent of prescribed burning forecast under each alternative).

More detail on the assumptions, methods, and data used for analysis of each issue is provided in the Proposed Planning Criteria and State Director Guidance for this RMP, which is incorporated here by reference (BLM 2012a, pp. 15-44).

How would BLM management actions affect the restoration of native plant communities?

Key Points
• Without herbicide use, prairie and savanna habitats would not be restored to meet high quality habitat conditions. As a result, the No Action alternative and Alternatives 3B and 3C would not restore any high quality prairie or oak savanna. • Alternative 1 would restore high quality prairie and oak savanna in most of the planning area. • Alternatives 2A and 2B would restore high quality prairie and oak savanna in most of the designated critical habitat, and would create the most well-connected network of high quality prairie and savanna habitat of all alternatives. • Alternative 3A would restore high quality prairie in most sites currently occupied by listed species.

Efficacy of Management Tools

All alternatives would employ mowing and other mechanical treatments, manual treatments, and prescribed burning to restore and maintain native plant communities. Alternatives 1, 2A, 2B, and 3A would also employ herbicides as part of restoration and maintenance treatments. Mechanical and manual treatments and prescribed burning would be effective at maintaining current plant communities and avoiding successional change to other plant communities on a site. However, in the absence of herbicide use, these treatments would not be effective at restoring wet prairie, upland prairie, or oak savanna in the planning area from their current low quality condition to high quality habitat conditions.

This conclusion is consistent with the empirical results in the planning area, in which manual and mechanical treatments and prescribed burning have been applied for a decade without successfully restoring any high quality wet prairie, upland prairie, or oak savanna. This conclusion is consistent with the experience of the West Eugene Wetlands land-owning partners - the City of Eugene, The Nature Conservancy, and the U.S. Army Corps of Engineers - who concluded that non-chemical treatments can be effective on a small scale, but the effects are not lasting (M. Benotsch, The Nature Conservancy, et al. *personal communication*, April 14, 2011). In addition, this conclusion is consistent with regional studies of prairie and savanna restoration, as described below.

The U.S. Fish and Wildlife Service Willamette Valley National Wildlife Refuges Draft Comprehensive Conservation Plan and Environmental Assessment analyzed the effectiveness of habitat management tools for prairie and savanna restoration and maintenance in the Willamette Valley, primarily as a summary of existing research. That analysis concluded that no individual manual or mechanical treatment was clearly superior in fulfilling restoration objectives. Burning was effective in reducing woody cover but reduced the flowering of the key native grass. Hand-removal of woody species was also effective at reducing woody cover and promoted the abundance of some native species, but it sometimes increased the cover of non-native herbaceous species. Mowing with removal of cut material

was ineffective in reducing woody cover and tended to promote non-native herbaceous species. The U.S. Fish and Wildlife Service identified the need to include herbicide application together with other non-chemical treatment methods for habitat restoration and maintenance (USFWS 2011b, pp. 6-6 - 6-10). That analysis is incorporated here by reference.

Stanley et al. also analyzed the effectiveness of habitat management tools for prairie and savanna restoration and maintenance in the Willamette Valley through experimentation. That analysis concluded that a combined management strategy using both herbicides and burning combined with native plant seed addition effectively improved prairie ecosystems. Mowing was ineffective at reducing non-native grasses (Stanley et al. 2011). That analysis is incorporated here by reference.

Dennehey et al. analyzed the effectiveness of habitat management tools in controlling invasive plants in prairie and savanna restoration and maintenance in Northwestern prairies, savannas, and oak woodlands. That analysis concluded that herbicides are effective for control of the important invasive plant species in the planning area. Mechanical and manual treatments and prescribed burning without herbicide use are generally not effective for control of most of the invasive plant species in the planning area (Dennehey et al. 2011). That analysis is incorporated here by reference.

The U.S. Fish and Wildlife Service provided a biological opinion on the U.S. Army Corps of Engineers habitat management program at Fern Ridge Lake, which is partially within the planning area boundary. That biological opinion summarizes the habitat management tools used for prairie and savanna restoration and maintenance, and describes the role and effectiveness of prescribed burning, mowing, manual treatments in habitat restoration and maintenance. That biological opinion documents the role of herbicide use and the need for herbicide use to manage infestations of weeds that are intractable to other methods of control in the habitat management program of the U.S. Army Corps of Engineers (USFWS 2011a, pp. 3-5, 17-19, 22-24). That discussion is incorporated here by reference.

The effect on plant communities of those alternatives that employ all management tools - Alternatives 1, 2A, 2B, and 3A - would vary largely with the allocation of portions of the planning area to the Prairie Restoration Area and the Natural Maintenance Area. Under each of these alternatives, the management direction within the Prairie Restoration Area would effectively restore and maintain high quality prairie and oak savanna plant communities. Vegetation treatments within the Natural Maintenance Area would be designed primarily to control noxious weeds and invasive native and non-native plants. As a result, the management direction within the Natural Maintenance Area would maintain prairie and oak savanna plant communities in their current low quality condition.

Plant Community Abundance

Under all alternatives, the extent of ash swale/riparian and oak woodland would decrease, and the extent of total wet prairie communities (combined high and low quality) and oak savanna (combined high and low quality) would increase, as a result of thinning and other management treatments. The amount of change in these plant communities would differ among the alternatives, as detailed below (Table 14). The differences in plant community abundance among the alternatives results from the

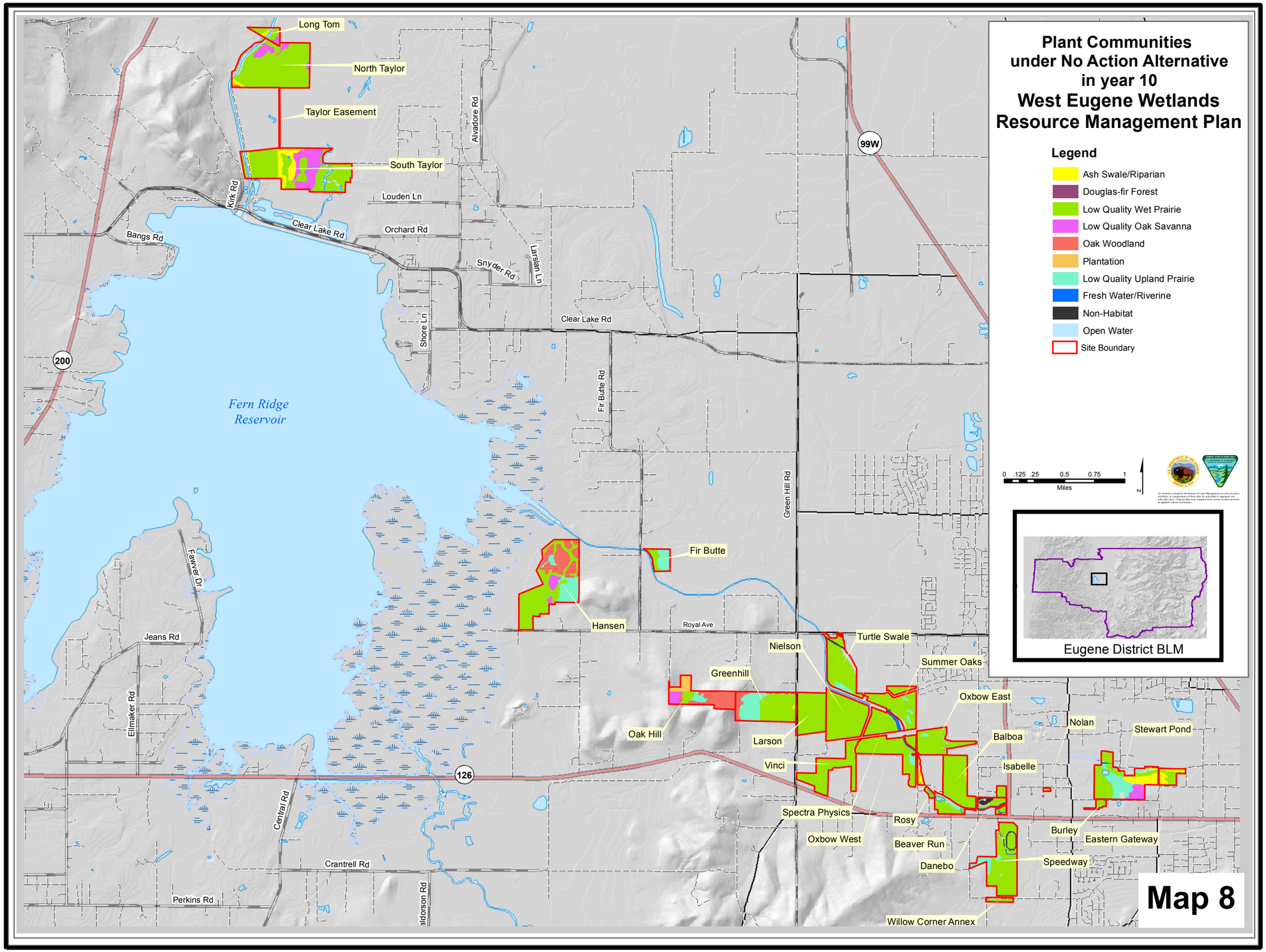
differences in the extent and location of the land use allocations under the alternatives. Under all alternatives, the existing small acreage of plantation and Douglas-fir forest would remain approximately unchanged.

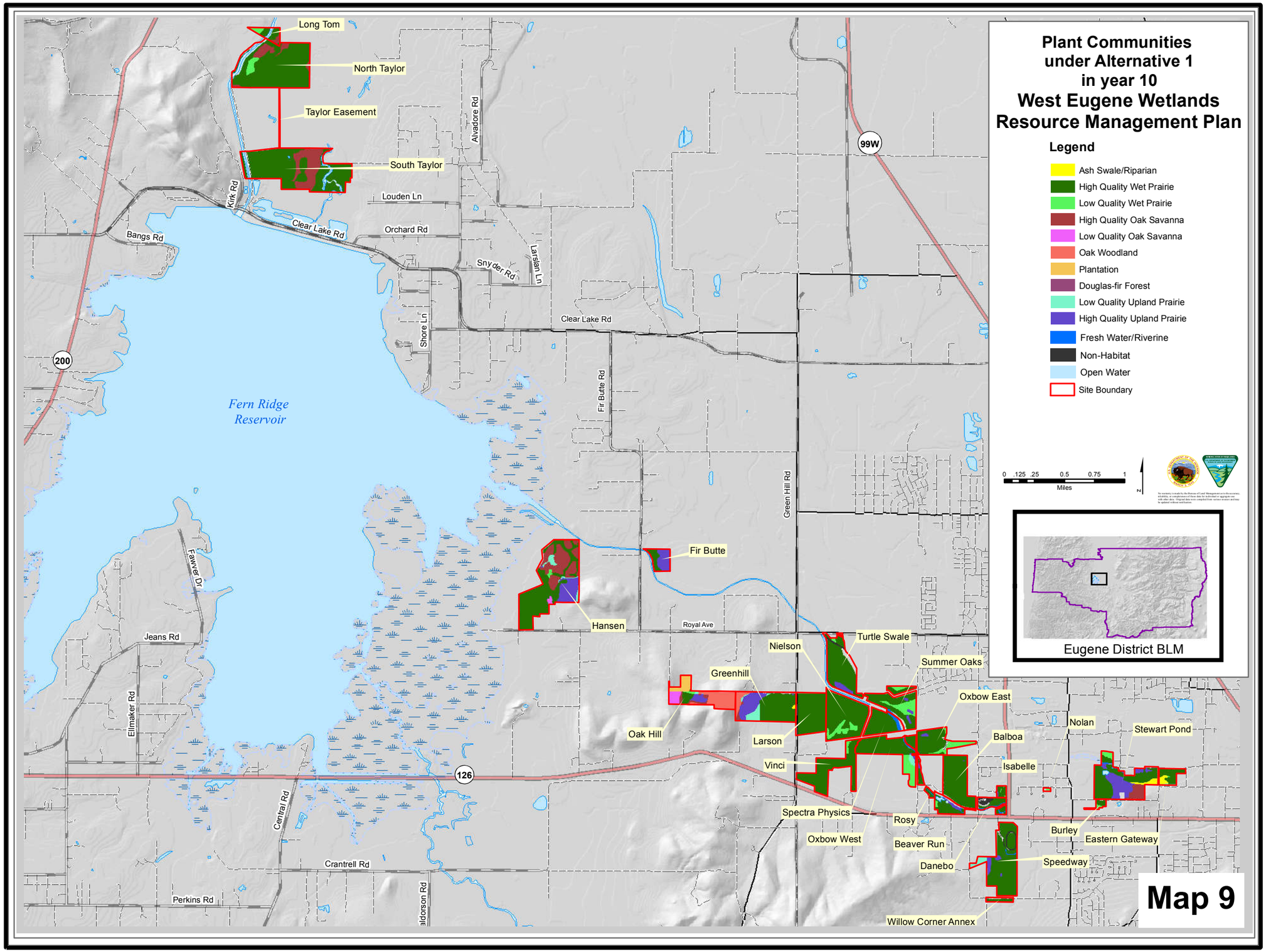
Under the No Action alternative, the extent of ash swale/riparian would be reduced from 173 acres to 54 acres, increasing the extent of total wet prairie communities from 834 acres to 953 acres. The extent of oak woodland would be reduced from 120 acres to 74 acres, increasing the extent of total oak savanna communities from 23 acres to 69 acres (Map 8).

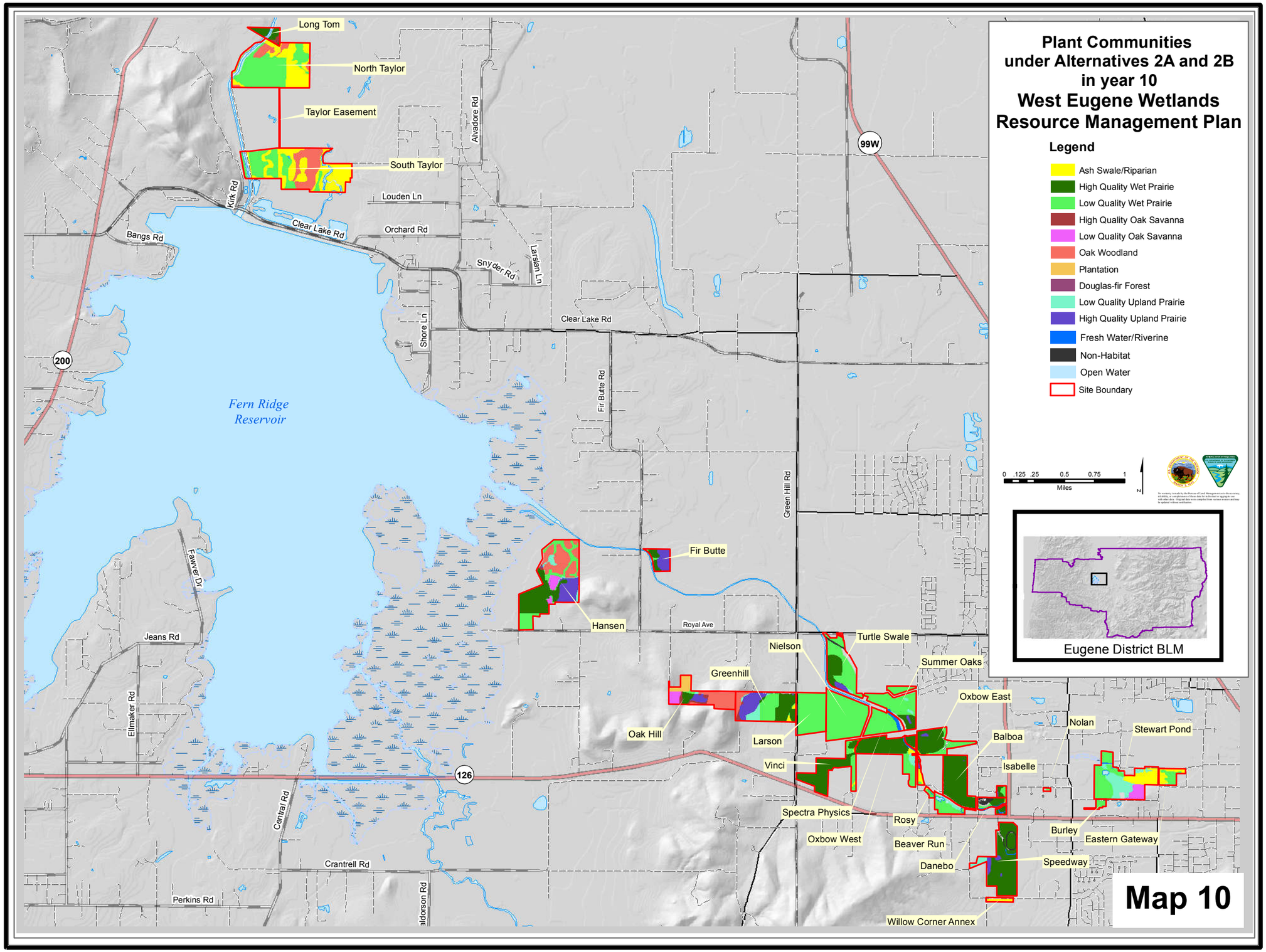
Under Alternative 1, the extent of ash swale/riparian would be reduced from 173 acres to 7 acres, increasing the extent of total wet prairie communities from 834 acres to 1,000 acres. This would be the biggest shift of ash swale/riparian to wet prairie among all alternatives. The extent of oak woodland would be reduced from 120 acres to 29 acres, increasing the extent of total oak savanna communities from 23 acres to 114 acres. This would be the biggest shift of oak woodland to oak savanna among all alternatives (Map 9).

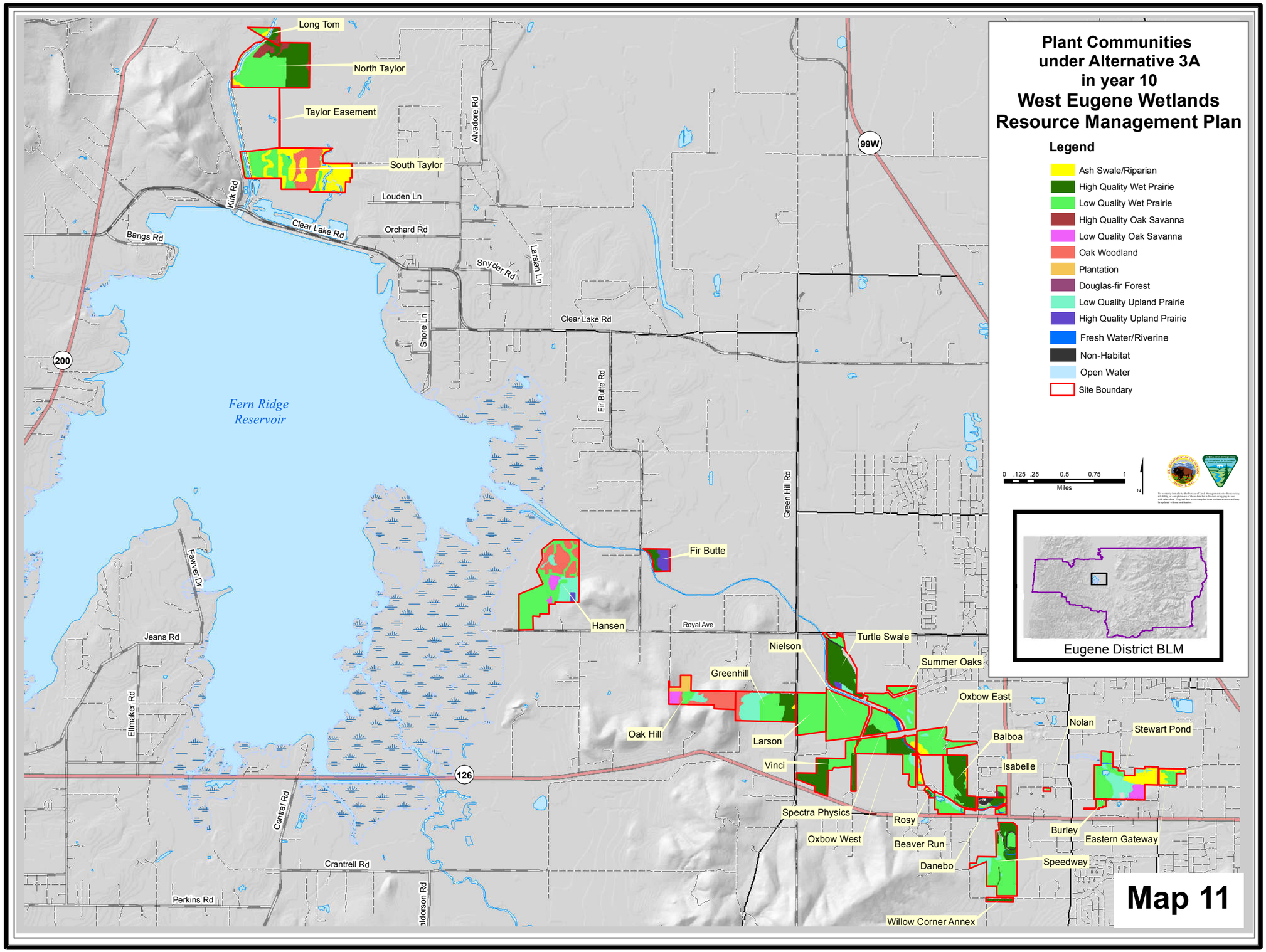
Under Alternatives 2A and 2B, the extent of ash swale/riparian would be reduced from 173 acres to 158 acres, increasing the extent of total wet prairie communities from 834 acres to 849 acres. This would be the smallest shift of ash swale/riparian to wet prairie among all alternatives. The extent of oak woodland would be reduced from 120 acres to 111, increasing the extent of total oak savanna communities from 23 acres to 32 acres. This would be the smallest shift of oak woodland to oak savanna among all alternatives (Map 10).

Under Alternatives 3A, 3B, and 3C, the extent of ash swale/riparian would be reduced from 173 acres to 115 acres, increasing the extent of total wet prairie communities from 834 acres to 891 acres. The extent of oak woodland would be reduced from 120 acres to 107 acres, increasing the extent of total oak savanna communities from 23 acres to 36 acres (Maps 11, 12).


Plant Communities
under No Action Alternative
in year 10
West Eugene Wetlands
Resource Management Plan
Legend
Ash Swale/Riparian
Douglas-fir Forest
Low Quality Wet Prairie
Low Quality Oak Savanna
Oak Woodland
Plantation
Low Quality Upland Prairie
Fresh Water/Riverine
Non-Habitat
Open Water
Site Boundary
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Nielson
Turtle Swale
Summer Oaks
Greenhill
Oxbow East
Oak Hill
Larson
Vinci
Balboa
Nolan
Stewart Pond
Isabelle
Spectra Physics
Rosy
Oxbow West
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex
Fern Ridge
Reservoir
Alvadore Rd
Louden Ln
Kirk Rd
Clear Lake Rd
Orchard Rd
Bangs Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Royal Ave
Fairver Dr
Jeans Rd
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
99W
200
126
Map 8


Plant Communities
under Alternative 1
in year 10
West Eugene Wetlands
Resource Management Plan
Legend
Ash Swale/Riparian
High Quality Wet Prairie
Low Quality Wet Prairie
High Quality Oak Savanna
Low Quality Oak Savanna
Oak Woodland
Plantation
Douglas-fir Forest
Low Quality Upland Prairie
High Quality Upland Prairie
Fresh Water/Riverine
Non-Habitat
Open Water
Site Boundary
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Nielson
Turtle Swale
Summer Oaks
Greenhill
Oxbow East
Oak Hill
Larson
Balboa
Nolan
Stewart Pond
Vinci
Isabelle
Spectra Physics
Rosy
Burley
Oxbow West
Beaver Run
Eastern Gateway
Danebo
Speedway
Willow Corner Annex
Fern Ridge
Reservoir
Alvadore Rd
Louden Ln
Kirk Rd
Clear Lake Rd
Orchard Rd
Bangs Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Royal Ave
Fawver Dr
Jeans Rd
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
99W
200
126
Map 9


Plant Communities
under Alternatives 2A and 2B
in year 10
West Eugene Wetlands
Resource Management Plan
Legend
Ash Swale/Riparian
High Quality Wet Prairie
Low Quality Wet Prairie
High Quality Oak Savanna
Low Quality Oak Savanna
Oak Woodland
Plantation
Douglas-fir Forest
Low Quality Upland Prairie
High Quality Upland Prairie
Fresh Water/Riverine
Non-Habitat
Open Water
Site Boundary
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Nielson
Turtle Swale
Summer Oaks
Greenhill
Oxbow East
Oak Hill
Larson
Balboa
Nolan
Stewart Pond
Vinci
Isabelle
Spectra Physics
Rosy
Burley
Oxbow West
Beaver Run
Eastern Gateway
Danebo
Speedway
Willow Corner Annex
Fern Ridge
Reservoir
Alvadore Rd
Louden Ln
Kirk Rd
Clear Lake Rd
Orchard Rd
Bangs Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Royal Ave
Fawver Dr
Jeans Rd
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
99W
200
126
Map 10


Plant Communities
under Alternative 3A
in year 10
West Eugene Wetlands
Resource Management Plan
Legend
Ash Swale/Riparian
High Quality Wet Prairie
Low Quality Wet Prairie
High Quality Oak Savanna
Low Quality Oak Savanna
Oak Woodland
Plantation
Douglas-fir Forest
Low Quality Upland Prairie
High Quality Upland Prairie
Fresh Water/Riverine
Non-Habitat
Open Water
Site Boundary
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Nielson
Turtle Swale
Summer Oaks
Greenhill
Oak Hill
Larson
Vinci
Oxbow East
Balboa
Isabelle
Nolan
Stewart Pond
Spectra Physics
Oxbow West
Rosy
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex
Fern Ridge
Reservoir
Alvadore Rd
Kirk Rd
Louden Ln
Clear Lake Rd
Orchard Rd
Bangs Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Royal Ave
Fairver Dr
Jeans Rd
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
99W
200
126
Map 11

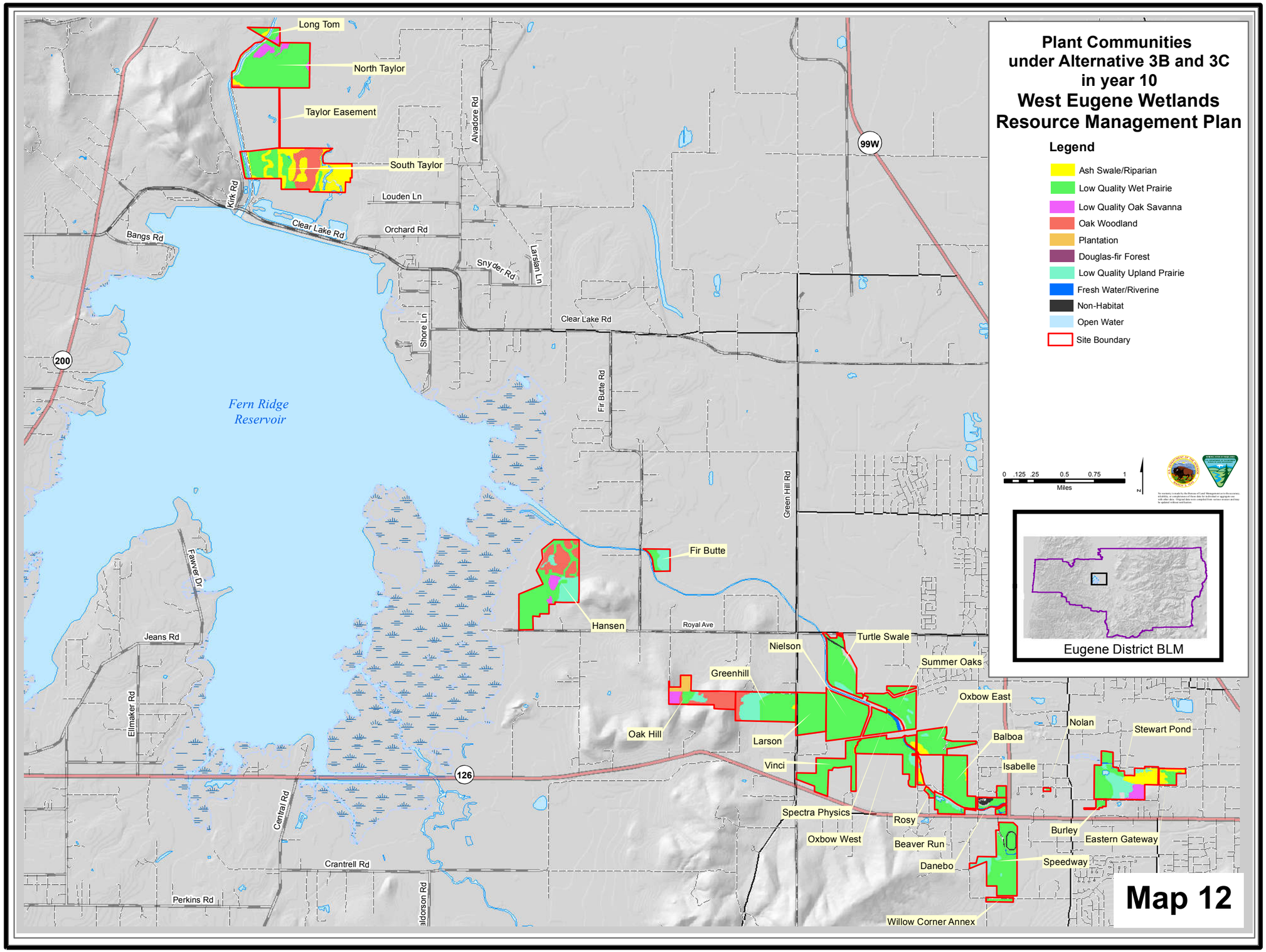

Plant Communities
under Alternative 3B and 3C
in year 10
West Eugene Wetlands
Resource Management Plan
Legend
Ash Swale/Riparian
Low Quality Wet Prairie
Low Quality Oak Savanna
Oak Woodland
Plantation
Douglas-fir Forest
Low Quality Upland Prairie
Fresh Water/Riverine
Non-Habitat
Open Water
Site Boundary
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Long Tom
North Taylor
Taylor Easement
South Taylor
Fir Butte
Hansen
Nielson
Turtle Swale
Summer Oaks
Greenhill
Oak Hill
Larson
Oxbow East
Balboa
Nolan
Stewart Pond
Vinci
Isabelle
Spectra Physics
Rosy
Oxbow West
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex
Fern Ridge
Reservoir
Bangs Rd
Kirk Rd
Clear Lake Rd
Louden Ln
Orchard Rd
Alvadore Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
Royal Ave
Jeans Rd
Fawver Dr
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
99W
200
126
Map 12

Table 14. Plant community abundance under all alternatives in 10 years

Plant community	acres							
	Current	No Action	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 3C
High quality wet prairie	0	0	937	346	346	250	0	0
Low quality wet prairie	834	953	62	503	503	642	891	891
High quality upland prairie	0	0	93	65	65	17	0	0
Low quality upland prairie	116	116	23	51	51	99	116	116
High quality oak savanna	0	0	106	9	9	13	0	0
Low quality oak savanna	23	69	8	23	23	23	36	36
Oak woodland	120	74	29	111	111	107	107	107
Ash swale/riparian	173	54	7	158	158	115	115	115

High Quality Prairie and Savanna

Under the No Action alternative, Alternative 3B, and Alternative 3C, there would be no acres of high quality wet prairie, high quality upland prairie, or high quality oak savanna in 10 years (Figure 16). The manual and mechanical restoration treatments and prescribed burning used under these alternatives would not be sufficient to shift the existing low quality plant communities to high quality. No acres would meet recovery criteria for wet prairie, upland prairie, or oak savanna diversity as outlined the Recovery Plan (USFWS 2010).

Under Alternative 1, there would be 937 acres of high quality wet prairie, 93 acres of high quality upland prairie, and 106 acres of high quality oak savanna in 10 years, the most for each community of any alternative (Figure 16). This large increase in high quality prairie and savanna would occur because Alternative 1 would allocate the largest acreage to the Prairie Restoration Area and would employ all management tools, including herbicides, in habitat restoration and maintenance.

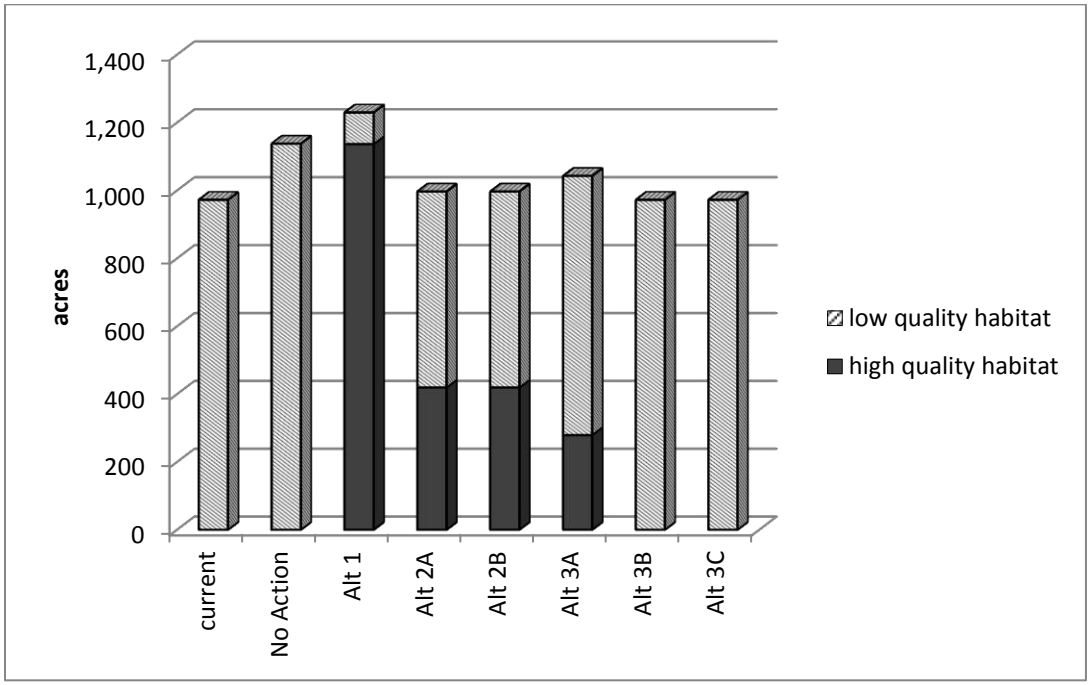
Under Alternatives 2A and 2B, there would be 346 acres of high quality wet prairie, 65 acres of high quality upland prairie, and 9 acres of high quality oak savanna in 10 years.

Under Alternative 3A, there would be 250 acres of high quality wet prairie, 17 acres of high quality upland prairie, and 13 acres of high quality oak savanna in 10 years. Although Alternative 3A would have the same land use allocations as Alternatives 3B and 3C, it would employ all management tools, including herbicides, in habitat restoration and maintenance. The addition of herbicides to the

available management tools would allow Alternative 3A to restore and maintain high quality prairie and savanna habitats.

On other lands within the planning area boundary, the only sites that reasonably would be expected to develop high quality prairie or savanna habitat within ten years are 94 acres of high quality upland prairie on land managed by the U.S. Army Corps of Engineers (W. Messinger, U.S. Army Corps of Engineers, *personal communication*, February 7, 2012) and 228 acres of high quality wet prairie and 3 acres of high quality upland prairie on City of Eugene land at Coyote Prairie (D. Steeck, City of Eugene, *personal communication,* August 9, 2012). Although habitat management continues on other West Eugene Wetlands partner lands, it is not reasonably foreseeable that those sites would attain high quality prairie or savanna within 10 years (D. Steeck, City of Eugene, *personal communication*, January 20, 2012; J. Nuckols, The Nature Conservancy, *personal communication*, February 6, 2012).

Figure 16. Total prairie and savanna plant community abundance in the planning area in 10 years under all alternatives (high quality and low quality wet prairie, upland prairie, and oak savanna)



Connectivity of High Quality Prairie and Savanna

Connectivity among subpopulations of threatened and endangered species will depend, in part, on connectivity among patches of high quality prairie and savanna habitat. The West Eugene Wetlands Threatened and Endangered Plant Augmentation Environmental Assessment addressed measurements of habitat connectivity in the planning area. That analysis concluded that using a threshold distance of 200 feet between habitat patches best reflects the functional connectivity for the habitats and species of interest in the planning area. This finer-scale connectivity would reflect a

distance that supports frequent and consistent pollinator movement among plant patches and would present a lower risk of loss of a sub-population from stochastic disturbance (BLM 2011, p. 4). That analysis is incorporated here by reference.

This analysis examines the connectivity of habitat patches using FRAGSTATS, a spatial patterns analysis program for categorical maps. FRAGSTATS quantifies the extent and spatial configuration of patches within a landscape (McGarigal et al., 2012). This analysis employs the FRAGSTATS connectance index, using a 200-foot threshold distance, treating high quality wet prairie, high quality upland prairie, and high quality oak savanna as patches, in various combinations. The analysis examines the connectivity of high quality wet prairie alone, which reflects habitat for Willamette daisy and Bradshaw's lomatium. The analysis examines the connectivity of the combined patches of high quality upland prairie and high quality oak savanna, which reflects habitat for Kincaid's lupine. The analysis examines the connectivity of the combined patches of high quality wet prairie, high quality upland prairie, and high quality oak savanna, which reflects habitat for various life stages of Fenders' blue butterfly.

The connectance index is defined as the number of functional joinings between patches of the same type within the threshold distance. Connectance is reported as a percentage of the maximum possible connectance given the number of patches. The higher the connectance value, the better connected the network of patches. If each patch of high quality habitat within the planning area were within 200 feet of every other patch of high quality habitat, the connectance index would be 100. If no patches were within 200 feet of another patch, the connectance index would be 0. This analysis of connectance includes patches of high quality habitat that are expected to develop on lands managed by others within the planning area boundary.

Under the No Action alternative, Alternative 3B, and Alternative 3C, no high quality wet prairie, high quality upland prairie, or high quality oak savanna would develop. Therefore there would be no patches to evaluate for connectivity. Pollinator connectivity would not be developed under these alternatives, and pollinators would be relegated to use of low quality habitat. Because a functional network of habitat for pollinators would not develop under these alternatives, pollinator contributions to plant population performance would be inadequate to ensure adequate gene flow and prevent the problems associated with the isolation of small populations for threatened and endangered species and sensitive plant species in the planning area.

Alternatives 2A and 2B would create the most well-connected network of high quality prairie and savanna habitat within the planning area boundary. The Prairie Restoration Area under these alternatives, where high quality prairie and savanna habitat would develop, would be allocated in the "core" of the planning area: from Speedway in the southeast to Fir Butte and Hansen in the northwest. This "core" area has an abundance of BLM-administered lands, with most sites close together. This concentration of nearby BLM-administered lands allocated to the Prairie Restoration Area leads to a highly connected network of high quality prairie and savanna habitat. Under

Alternatives 2A and 2B, outlying parcels like North and South Taylor and Stewart Pond would not be included in the Prairie Restoration Area.

Although Alternative 1 would develop the most total acres of high quality prairie and savanna, the network of high quality prairie and savanna would not be as well connected as in Alternatives 2A and 2B. Alternative 1 includes in the Prairie Restoration Area outlying sites within the planning area: the cluster of Long Tom, North Taylor and South Taylor on the north side of Fern Ridge Reservoir, and Stewart Pond on the east side of the planning area. There is little potential for connectivity with these outlying sites because of land ownership patterns.

Alternative 3A would create the least connected network of all alternatives that create any high quality prairie and savanna habitat. Alternative 3A allocates the fewest acres to the Prairie Restoration Area and creates fewer acres of high quality prairie and savanna habitat than Alternatives 1, 2A, or 2B. As a result, the patches of high quality prairie and savanna habitat are more fragmented and isolated than under Alternatives 1, 2A, or 2B. This lack of connectivity would reduce the inter-plant pollinator function between these outlying sites and the rest of the planning area and would not facilitate gene flow among populations of threatened and endangered species and sensitive plant species.

Table 15. Connectance values for high quality prairie and savanna in 10 years under all alternatives

	No Action	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 3C
wet prairie	--	8.02	10.73	10.73	4.76	--	--
upland prairie and oak savanna	--	6.74	8.58	8.58	4.00	--	--
wet prairie, upland prairie, and oak savanna	--	3.76	5.96	5.96	2.86	--	--

How would BLM management actions contribute to meeting the recovery objectives described in the recovery plan for ESA-listed species?

Key Points
• Under all action alternatives, short-term abundance of all listed plants would greatly exceed recovery targets for abundance. However, the failure to restore high quality prairie and savanna habitat under the No Action alternative and Alternatives 3B and 3C would lead to eventual declines in populations. • Alternatives 1, 2A, 2B, and 3A would meet all recovery targets for all listed plants. • Alternatives 1, 2A, 2B, and 3A would meet Fender's blue butterfly recovery targets for habitat quality and management. • Alternatives 2A and 2B would create less high quality habitat for Fender's blue butterfly than Alternative 1, but would create a similarly well-connected network of large patches of habitat. Alternative 3A would not create a network of connected, large patches of habitat for Fender's blue butterfly and would fail to meet recovery targets for abundance and distribution.

Threatened and Endangered Plants

All alternatives would increase the populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the planning area through population augmentation by planting of plugs or seeding. All action alternatives would increase the populations of golden paintbrush by planting of plugs or seeding. The No Action alternative would not include reintroduction of golden paintbrush in the planning area.

Suitable sites for plant augmentation are identified in the decision for the West Eugene Wetlands Threatened and Endangered Plant Augmentation (BLM 2012b). The environmental assessment for the West Eugene Wetlands Threatened and Endangered Plant Augmentation described analytical assumptions for the analysis of plant augmentation, including suitable planting sites, recommended planting and seeding densities, and short-term survivorship and establishment (BLM 2011, pp. 3-4). Those descriptions are incorporated here by reference.

For plant augmentation under the No Action alternative, this analysis assumes that all sites identified for augmentation in the decision for the West Eugene Wetlands Threatened and Endangered Plant Augmentation (BLM 2012b) would have plant augmentation. For the action alternatives, this analysis assumes that all suitable sites identified in BLM 2012b that lie within the Prairie Restoration Area would have plant augmentation. Therefore, the No Action alternative would have more plant augmentation than any of the action alternatives for Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine. The No Action alternative would have no augmentation for golden paintbrush. Suitable sites for plant augmentation of golden paintbrush, although not addressed in BLM 2012b, are assumed in this analysis to be the same as suitable sites for augmentation of Kincaid's lupine, because of the similarity of the

species' habitat requirements (USFWS 2010). Short-term seedling establishment and plug survival of golden paintbrush are assumed in this analysis to be the same as Kincaid's lupine (BLM 2011, p. 3).

This analysis assumes that plant augmentation for Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush would be half planting and half seeding. This analysis assumes that plant augmentation for Willamette daisy would be all planting, because past experience with seeding of Willamette daisy has been unsuccessful (BLM 2011, p. 3).

The abundance of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine within the planning area boundary already exceeds the recovery target for abundance, as described in Chapter 3. Under all alternatives, plant augmentation would result in very large increases in abundances of each of these species. As a result, plant abundances in the planning area alone would exceed recovery targets for abundance for each species, at least in the short-term (Table 16). For golden paintbrush, there would be no augmentation under the No Action alternative. Therefore, there would be no population of golden paintbrush in the planning area under the No Action alternative. Under all action alternatives, plant augmentation would result in short-term abundance of golden paintbrush in the planning area that would greatly exceed the recovery target for abundance (Table 16).

Table 16. Short-term populations of threatened and endangered plant species in the planning area following augmentation by alternative

	Willamette daisy (# of plants)	Bradshaw's lomatium (# of plants)	Kincaid's lupine (m^2)	golden paintbrush (# of plants)
No Action	984,000	10,765,000	51,000	0
Alternative 1	981,000	10,726,000	42,000	17,133,000
Alternatives 2A, 2B	382,000	6,367,000	18,000	13,665,000
Alternatives 3A, 3B, 3C	178,000	2,047,000	8,000	350,000
Recovery target	15,000	15,000	7,500	1,000

It is uncertain whether there would be an adequate supply of plugs and seeds of the four listed plants to support the amount of plant augmentation described in the alternatives. The availability of plugs and seed would likely limit plant augmentation more than the availability of suitable sites. If the supply of

plugs and seeds is inadequate, the augmentation would take longer than described here to reach the population numbers in Table 16.

The distribution of Willamette daisy populations in the Eugene West Recovery Zone already meets the recovery target. The distribution of Bradshaw's lomatium populations in the Eugene West Recovery Zone may currently meet the recovery target, depending on whether the U.S. Army Corps of Engineers Fern Ridge sites is considered more than one large population. Nevertheless, BLM augmentation of Bradshaw's lomatium under all alternatives would establish new large populations within two miles of existing large populations, meeting the recovery target for distribution. Similarly, BLM augmentation Kincaid's lupine under all alternatives would establish new large populations within two miles of existing large populations, meeting the recovery target for distribution. BLM augmentation of golden paintbrush under all action alternatives would meet the recovery target for distribution by establishing a large population within the Eugene West Recovery Zone.

These results for abundance and distribution reflect short-term plant abundances; long-term survival of augmented populations (within 15 years) would differ for some alternatives, as described below. It is not possible to make quantitative estimates of long-term survival of existing or augmented populations or future natural recruitment of the listed plant species. Very few augmentation sites are available to make reasonable estimates of survivorship over the long-term to date (BLM 2011; T. Kaye, Institute for Applied Ecology, *personal communication*, July 8, 2011). Nevertheless, it is possible to make qualitative descriptions of whether overall long-term population trends would be positive, stable, or negative, based on habitat quality (USFWS 2010, pp. III-6 – III-9; IV-1 – IV-6; IV-54 – IV-59; USFWS 2008, pp. 25-31; 34-37; 39-42; 45-46).

Under the No Action alternative, the short-term abundance of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine would each be the highest of all alternatives. However, short-term survival of augmented populations under the No Action alternative would not reflect long-term survival rates, because habitat quality would not be restored and maintained under the No Action alternative. The absence of herbicide use under the No Action alternative would result in failure to restore sites to high quality wet prairie, upland prairie, or oak savanna habitat conditions, as described in the issue above related to plant communities. As a result, the habitat condition under the No Action alternative would not meet the recovery targets for habitat quality. Competition from invasive grasses and other non-native plant species would reduce plant survival rates. Without high quality wet prairie, upland prairie, and oak savanna plant communities, functional pollinator networks would not develop in the planning area. Despite the short-term increase in abundance from augmentation, the failure to restore and maintain high quality wet prairie, upland prairie, and oak savanna plant communities would lead to eventual declines in populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the planning area over the long term. Therefore, the No Action alternative would not meet the population trend recovery targets for Willamette daisy, Bradshaw's lomatium, or Kincaid's lupine. Under the No Action alternative, there would be no population of golden paintbrush in the planning area. Therefore, the No Action alternative would not contribute to meeting any recovery targets for golden paintbrush.

Under Alternative 1, the short-term abundance of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine would each be the second highest of all alternatives, and the short-term abundance of golden paintbrush would be the highest of all alternatives. The use of all management tools, including herbicides, would result in the restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities in the Prairie Restoration Area, which would meet the recovery targets for habitat quality. Competition from invasive grasses and other non-native plant species would be controlled, which would help maintain augmented populations of the listed plant species. The fine-scale connectivity of high quality habitat would be the second highest among all alternatives, as described in the issue above related to plant communities. As a result of habitat restoration and maintenance, long-term survival rates of Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush would be consistent with short-term survival rates, and augmented populations would be maintained over the long-term. Under Alternative 1, all existing populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine would occur within the Prairie Restoration Area. The restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities within the Prairie Restoration Area would maintain the existing populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the planning area. Therefore, Alternative 1 would meet the population trend recovery targets for Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush.

Under Alternatives 2A and 2B, the short-term abundance of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine would each be the third highest of all alternatives, and the short-term abundance of golden paintbrush would be the second highest of all alternatives. The use of all management tools, including herbicides, would result in the restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities in the Prairie Restoration Area and Long Tom ACEC, which would meet the recovery targets for habitat quality, similar to Alternative 1 and Alternative 3A. The fine-scale connectivity of high quality habitat would be the highest among all alternatives, as described in the issue above related to plant communities. As a result of habitat restoration and maintenance, long-term survival rates of Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush in the Prairie Restoration Area and Long Tom ACEC would be consistent with short-term survival rates, and augmented populations would be maintained over the long-term. Under Alternatives 2A and 2B, some existing populations of Willamette daisy and Bradshaw's lomatium would be within the Natural Maintenance Area: a small portion of the Willamette daisy population at Vinci, and Bradshaw's lomatium at Willow Creek Annex, Rosy, and North Taylor. These populations would decline over the long-term because high quality wet prairie would not be restored in these areas. Nevertheless, Alternatives 2A and 2B would meet the population trend recovery targets for Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush because of the maintenance of existing populations within the Prairie Restoration Area and Long Tom ACEC and the long-term maintenance of augmented populations.

The only difference between Alternatives 2A and Alternative 2B that could potentially result in different effects on Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush would be that Alternative 2B would open the Natural Maintenance Area to saleable mineral development and

disposal. However, this potential difference would not result in any difference in how the alternatives would contribute to meeting recovery targets. The plant habitat in the Natural Maintenance Area would all be low quality habitat and therefore would not contribute to meeting recovery targets. As discussed below in the issue related to access, saleable minerals within the Natural Maintenance Area under Alternative 2B would generally be available relative to the anticipated demand, and decisions on saleable mineral development or disposal would be made on a case-by-case basis. Some existing populations of Willamette daisy and Bradshaw's lomatium could potentially be affected within the Natural Maintenance Area: a small portion of the Willamette daisy population at Vinci, and Bradshaw's lomatium at Willow Creek Annex, Rosy, and North Taylor. However, any specific effects on any populations or low quality plant habitat would be speculative in the absence of any specific saleable mineral proposal. Therefore, the differences in design between Alternative 2A and Alternative 2B would result in no meaningful difference in the reasonably foreseeable effects on Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush.

Under Alternatives 3A, 3B, and 3C, the short-term abundance of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine would each be the lowest of all alternatives, and the short-term abundance of golden paintbrush would be the second lowest of all alternatives. Nevertheless, the short-term abundance under Alternatives 3A, 3B, and 3C would still exceed the recovery targets for abundance.

Under Alternative 3A, the use of all management tools, including herbicides, would result in the restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities in the Prairie Restoration Area, which would meet the recovery targets for habitat quality, similar to Alternative 1 and Alternative 2A and 2B. The fine-scale connectivity of high quality habitat would be the third highest among all alternatives, as described in the issue above related to plant communities. As a result of habitat restoration and maintenance, long-term survival rates of Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush would be consistent with short-term survival rates, and augmented populations would be maintained over the long-term. Under Alternative 3A, all existing populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine would occur within the Prairie Restoration Area. The restoration of maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities within the Prairie Restoration Area would maintain the existing populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the planning area. Therefore, Alternative 3A would meet the population trend recovery targets for Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush.

Under Alternatives 3B and 3C, short-term survival of augmented populations would not reflect long-term survival rates, because habitat quality would not be restored and maintained, similar to the No Action alternative. The absence of herbicide use under Alternatives 3B and 3C would result in failure to restore sites to high quality wet prairie, upland prairie, or oak savanna habitat conditions, as described in the issue above related to plant communities. As a result, the habitat condition under the Alternatives 3B and 3C would not meet the recovery targets for habitat quality, similar to the No Action alternative. Despite the short-term increase in abundance from augmentation, the failure to restore and

maintain high quality wet prairie, upland prairie, and oak savanna plant communities would lead to eventual declines in populations of Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine in the planning area over the long term, similar to the No Action alternative. The reintroduction of golden paintbrush would result in a short-term increase in abundance, which would not be maintained over the long term. Therefore, the Alternatives 3B and 3C would not meet the population trend recovery targets for Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, or golden paintbrush.

The only difference between Alternatives 3B and Alternative 3C that could potentially result in different effects on Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush would be that Alternative 3C would increase levels and types of recreation uses and identify the Stewart Pond site as a Special Recreation Management Area. Under Alternative 3C, there would be recreational developments at Stewart Pond which would result in increased recreational use of the site, as described in the issue below related to recreational opportunities. These differences in use at Stewart Pond could result in increased trampling and other visitor-related effects. However, the plant habitat at Stewart Pond under Alternatives 3B and 3C would be low quality habitat (as well as under all alternatives except Alternative 1), and therefore would not contribute to meeting recovery targets. Nor would there be any plant augmentation of any of the listed plant species at Stewart Pond under Alternative 3B. Therefore, the differences in design between Alternative 3B and Alternative 3C would result in no meaningful difference in the reasonably foreseeable effects on Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush.

In addition to the augmentation by BLM of populations of Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush, it is highly probable that other land owners within the planning area boundary will also augment populations, as detailed below, within the next ten years (T. Taylor, City of Eugene, *personal communication*, May 14, 2012; W. Messinger, U.S. Army Corps of Engineers, *personal communication*, May 14, 2012; M. Benotsch, The Nature Conservancy, *personal communication*, May 17, 2012).

- Willamette daisy: the U.S. Army Corps of Engineers expects to plant approximately 1,000 to 2,000 plugs per year at South Marsh; and The Nature Conservancy expects to seed less than one pound of seed
- Bradshaw's lomatium: the City of Eugene expects to seed approximately one pound of seed; the U.S. Army Corps of Engineers expects to seed approximately 1,000 to 2,000 seeds per year; and the Nature Conservancy expects to seed less than one pound of seed.
- Kincaid's lupine: the City of Eugene expects to plant approximately 500 to 1,000 plugs; the U.S. Army Corps of Engineers expects to plant approximately 1,000 to 2,000 plugs per year and seed approximately 50,000 seeds; and The Nature Conservancy expects to seed approximately 20,000 to 40,000 seeds per year.
- Golden paintbrush: the City of Eugene expects to plant approximately 500 to 1,000 plugs; and the U.S. Army Corps of Engineers implemented a seeding experiment with less than one pound of seed in 2011 but does not yet have any results on establishment.

As described above in the issue related to plant communities, the U.S. Army Corps of Engineers predicts that it will restore high quality upland prairie on 94 acres (W. Messinger, U.S. Army Corps of Engineers, *personal communication*, February 7, 2012). The U.S. Army Corps of Engineers expected augmentation of Kincaid's lupine and restoration to 94 acres of high quality upland prairie can be reasonably expected to provide a long-term contribution to the abundance of Kincaid's lupine within the planning area boundary. However, that augmentation would not establish a new large population using the two-mile threshold distance from the Recovery Plan (USFWS 2010). The City of Eugene predicts that it will restore high quality wet prairie on 165 acres at Coyote Prairie, in addition to the currently existing 63 acres of high quality wet prairie and 3 acres of high quality upland. That restoration by the City of Eugene includes planned augmentation of the currently small population of Bradshaw's lomatium and introduction of golden paintbrush (D. Steeck, City of Eugene, *personal communication,* August 9, 2012). Other than these restorations, other lands within the planning area boundary, including sites with current populations of listed plant species, cannot reasonably be expected to be restored to high quality prairie or savanna habitat, and therefore cannot reasonably be expected to provide a long-term contribution to plant abundances.

In summary, the No Action alternative would meet abundance and distribution recovery targets in the short-term, but would not meet habitat quality or population trend recovery targets for Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine (Table 17). The No Action alternative would not meet any recovery targets for golden paintbrush (Table 18). Alternatives 1, 2A, 2B, and 3A would meet all recovery targets for Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush. Alternatives 3B and 3C would meet abundance and distribution recovery targets in the short-term, but would not meet habitat quality or population trend recovery targets for Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and golden paintbrush.

Table 17. Short-term achievement of recovery targets for Willamette daisy, Bradshaw's lomatium, and Kincaid's lupine by alternative

	Recovery targets			
	Abundance	**Distribution**	**Habitat quality**	**Population trend**
No Action	yes	yes	**no**	**no**
Alternative 1	yes	yes	yes	yes
Alternatives 2A, 2B	yes	yes	yes	yes
Alternative 3A	yes	yes	yes	yes
Alternatives 3B, 3C	yes	yes	**no**	**no**

Table 18. Short-term achievement of recovery targets for golden paintbrush by alternative

	Recovery targets			
	Abundance	**Distribution**	**Habitat quality**	**Population trend**
No Action	**no**	**no**	**no**	**no**
Alternative 1	yes	yes	yes	yes
Alternatives 2A, 2B	yes	yes	yes	yes
Alternative 3A	yes	yes	yes	yes
Alternatives 3B, 3C	yes	yes	**no**	**No**

Fender's blue butterfly

The Recovery Plan identifies recovery targets for distribution and abundance of Fender's blue butterfly. There is incomplete and unavailable information on the effects of habitat amount, quality, and distribution on populations of Fender's blue butterfly. Non-habitat factors appear to have substantial year-to-year effects on Fender's blue butterfly populations, complicating any attempt to predict populations based on habitat conditions (USFWS 2010, pp. IV-6 – IV-10). As noted in Chapter 3, the populations of Fender's blue butterfly within the planning area boundary have fluctuated substantially over the past decade, while habitat conditions have been generally maintained at their current condition. Survey results for other populations within the range of the species show similar substantial fluctuations (USFWS 2010, p. II-4). McIntire et al. (2007) have developed a model to project Fender's blue butterfly populations based on habitat conditions, including habitat amount, quality, and distribution, but that model is not currently available to the BLM.

The Recovery Plan does identify the habitat patches and networks needed to achieve the recovery target for population distribution and abundance. The Recovery Plan also identifies that Fender's blue butterfly populations trends are correlated with the abundance and vigor of Kincaid's lupine on a site (USFWS 2010, p. II-7 – II-8). Therefore, this analysis will evaluate the contribution to the recovery target for distribution and abundance in terms of patches of high quality habitat with populations of Kincaid's lupine. This analysis will infer that such patches and networks of patches that meet the criteria identified in the Recovery Plan (USFWS 2010, p. IV-13) would result in meeting the recovery target for distribution and abundance of populations.

Short-term adverse effects

All alternatives would employ a range of management tools for habitat restoration and maintenance, including mowing, thinning, and prescribed burning. In addition, Alternatives 1, 2A, 2B, and 3A would include herbicide use as a management tool; the effects of herbicide use on Fender's blue butterfly are addressed specifically in the issue below related to herbicide effects. All of these management tools have the potential to affect Fender's blue butterfly. Biological opinions from the U.S. Fish and Wildlife Service have analyzed the effect of these management tools for habitat restoration and maintenance and catalogued short-term adverse effects to Fender's blue butterfly, but noted long-term beneficial effects (USFWS 2011a, pp. 16-25; USFWS 2008, pp. 24-48). Those opinions concluded that the adverse effects to Fender's blue butterfly from these habitat restoration and maintenance tools would be very low and of short duration and could be minimized by protective measures. The Recovery Plan also concluded that use of these management tools would result in substantial benefits to Fender's blue butterfly in the long term (USFWS 2010, pp. 24-29, 32-34). Those analyses are incorporated here by reference. The effects of application of these habitat management tools on Fender's blue butterfly in the planning area would be the same as in the opinions because:

- the specific management tools that would be used in the planning area are addressed in the opinions;
- the site-specific conditions of the planning area are similar to the conditions addressed by the opinions; and
- the alternatives would apply protective measures similar to those described in the opinions.

Therefore, with regards to non-chemical management tools, all alternatives would minimize adverse effects on Fender's blue butterfly, as described in the biological opinions and the Recovery Plan (USFWS 2010, p. IV-31).

Fender's blue butterflies would be incidentally killed or injured as a result of habitat restoration actions, but it is difficult to quantify the amount of mortality or injury. The U.S. Fish and Wildlife Service biological opinions estimated a maximum amount of mortality or injury that would occur as described below.

Mowing, thinning, other manual and mechanical vegetation management, plant augmentation, and surveys and monitoring would cause death or injury of a negligible percentage of larvae and eggs of Fender's blue butterfly due to crushing by machinery or foot traffic (USFWS 2008, p. 47). These effects would occur similarly under all alternatives. Although the total treatment acres would vary by alternative, the use of these management treatments at occupied Fender's blue butterfly sites would be of similar magnitude. Occupied Fender's blue butterfly sites represent a small portion of the planning area, and the magnitude of mowing, thinning, other manual and mechanical vegetation management, plant augmentation, and surveys and monitoring at these sites would be of similar magnitude under all alternatives.

Prescribed burning would result in burning or crushing of all of the eggs and larvae of Fender's blue butterfly in the burned area. These effects would occur similarly under all alternatives. Although the

total treatment acres would vary by alternative, the use of prescribed burning at occupied Fender's blue butterfly sites would be of similar magnitude. All alternatives would limit prescribed burning to one-third of the occupied habitat at sites with Fender's blue butterflies in a year. Based on 2011 population numbers at occupied sites in the planning area, prescribed burning could result in the mortality or injury of all of the eggs and larvae associated with 45 adult Fender's blue butterflies.

The biological opinions explain that it is not possible to calculate the number of adults, eggs or larvae of Fender's blue butterfly that would be killed or injured by incidental exposure to herbicide or from accidental crushing during herbicide application, but that the U.S. Fish and Wildlife Service expects that any death or injury would be less than ten percent of larvae and eggs in the action area, and less than one percent of adults (USFWS 2011a, p. 25). These effects would occur under Alternatives 1, 2A, 2B, and 3A. These effects would occur similarly under these alternatives. Although the total herbicide treatment acres would vary by alternative, the use of herbicides at occupied Fender's blue butterfly sites would be of similar magnitude.

Other landowners within the Eugene recovery zone are implementing actions that will have short-term adverse effects on Fender's blue butterfly populations in the recovery zone. The U.S. Army Corps of Engineers is implementing similar habitat restoration activities: on U.S. Army Corps of Engineers land, the U.S. Fish and Wildlife Service estimates that prescribed burning will kill all of the eggs and larvae associated with 430 adult Fender's blue butterflies; herbicide use will result in death or injury of less than ten percent of larvae and eggs in the action area and less than one percent of adults; and that population monitoring will cause the mortality or injury of up to 4 adults and an unquantifiable number of larvae and eggs (USFWS 2011a, p. 25). The U.S. Fish and Wildlife Service estimates that if prescribed burning were implemented on all occupied habitat on non-federal lands, all of the eggs and larvae associated with about 1,170 adult butterflies could be killed (USFWS 2008, p. 48). These short-term adverse effects on Fender's blue butterflies on other landowners would have an additive effect on overall population numbers within the Eugene recovery zone. The U.S. Fish and Wildlife Service has concluded that this level of short-term adverse effects is not likely to result in jeopardy to the Fender's blue butterfly or destruction or adverse modification of its critical habitat (USFWS 2011a, p.25; USFWS 2008, p. 48). The long-term cumulative effects of management actions on Fender's blue butterfly are addressed below.

Habitat effects

As described above in this issue under threatened and endangered plants, the U.S. Army Corps of Engineers predicts that it will restore high quality upland prairie on 94 acres and will augment populations of Kincaid's lupine on these sites. This analysis assumes that this habitat restoration and population augmentation will result in the creation of two large patches of high quality habitat with populations of Kincaid's lupine and a series of small patches of high quality patches. Other than this restoration, none of the land owners within the planning area boundary anticipate restoring any high quality prairie or savanna habitat with Kincaid's lupine that would meet Recovery Plan habitat targets.

Under the No Action alternative and Alternatives 3B and 3C, there would be no acres of high quality habitat for Fender's blue butterfly in the planning area. The 14 acres of currently-occupied Fender's blue butterfly habitat in the planning area would remain low quality wet prairie and low quality upland prairie. Habitat conditions would continue to have excessive litter cover, woody encroachment, a high percent of non-native species, and low diversity and low number of native nectar species. These 14 acres would remain vulnerable to both stochastic threats such as floods and accidental fires, and competitive pressures from exotic vegetation. Nearby non-occupied habitat would remain low quality. As a result, there would be no large patches (greater than 15 acres) of habitat between the current West Eugene and Willow Creek populations described in Chapter 3. Fender's blue butterflies would have a low probability of dispersal between existing occupied patches of low quality habitat, because patches are small (less than 15 acres) and isolated, and habitats are highly degraded with very little nectar sources. As a result, the No Action alternative and Alternatives 3B and 3C would not contribute to the meeting the recovery targets for Fender's blue butterfly in terms of distribution and abundance and habitat quality and management (Table 19).

Under Alternative 1, there would be a total of 1,137 acres of high quality habitat for Fender's blue butterfly habitat, the most of any alternative. Under Alternatives 2A and 2B, there would be 414 acres of high quality habitat for Fender's blue butterfly habitat. Under Alternative 3A, there would be 279 acres of high quality habitat for Fender's blue butterfly habitat (Table 19). Under Alternatives 1, 2A, 2B, and 3A, the 14 acres of currently-occupied Fender's blue butterfly habitat in the planning area would be restored to high quality wet prairie and high quality upland prairie and maintained in that condition. Alternatives 1, 2A, 2B, and 3A would all meet the recovery target for habitat quality and management (USFWS 2010, pp. IV-29, IV-34).

Table 19. High quality habitat for Fender's blue butterfly in 10 years, by alternative, in acres

	High quality wet prairie	High quality upland prairie	High quality oak savanna	total
No Action	0	0	0	0
Alternative 1	937	93	106	1,137
Alternatives 2A, 2B	346	65	9	414
Alternative 3A	250	17	13	279
Alternatives 3B, 3C	0	0	0	0

Of the total of 1,137 acres of high quality habitat that would develop under Alternative 1, 84 acres would be high quality habitat with populations of Kincaid's lupine. Alternative 1 would create two large patches of high quality habitat with populations of Kincaid's lupine at Hansen and Greenhill (Map 13). Habitat restoration and maintenance under Alternative 1 would provide the maximum possible connectivity of habitat patches for Fender's blue butterfly in the planning area. Under Alternative 1, the large patch at Hansen and the small patch at Fir Butte would form a connected network with the high quality habitat on U.S. Army Corps of Engineers land to the north and west. The large patch at Greenhill would form a connected network with small patches at Oak Hill, Summer Oaks, and Oxbow West. Small patches at Isabelle and Speedway would be connected to each other and would be near the existing Willow Creek population. However, there is no reasonably foreseeable development of high quality habitat on The Nature Conservancy land in the current Willow Creek population. Small patches at Stewart Pond would not be connected to patches on other sites. Nevertheless, the creation of two large patches and multiple networks of connected patches of high quality habitat with populations of Kincaid's lupine under Alternative 1, together with patches on U.S. Army Corps of Engineers land, would provide the habitat to meet the recovery target for distribution and abundance (USFWS 2010, pp. IV-13, IV-29, IV-34) (Table 20).

Even under Alternative 1, the network of habitat within the planning area would not provide a fully connected series of patches between the current West Eugene population and the Willow Creek population. Land ownership patterns preclude the possibility of fully connecting the network of patches at the Greenhill and Oak Hill sites with the network of patches at Fir Butte, Hansen, and sites on the U.S. Army Corps of Engineers land to the north and west. Also, the small patch at Oxbow West would be just beyond the threshold 0.6-mile distance from the small patch at Isabelle, precluding connection between these networks of patches.

Of the total of 414 acres of high quality habitat that would develop under Alternatives 2A and 2B, 53 acres would be high quality habitat with populations of Kincaid's lupine. Alternatives 2A and 2B would also create two large patches of high quality habitat with populations of Kincaid's lupine at Hansen and Greenhill, like Alternative 1 (Map 14). Alternatives 2A and 2B would create a network of habitat similar to Alternative 1, with one exception: Alternatives 2A and 2B would not create small patches of high quality habitat at Stewart Pond. Given that these small patches would not be connected to patches on other sites under Alternative 1, the connectivity of high quality habitat under Alternatives 2A and 2B would be effectively the same as Alternative 1. The creation of two large patches and multiple networks of connected patches under Alternative 2A and 2B, like Alternative 1, together with patches on U.S. Army Corps of Engineers land, would provide the habitat to meet the recovery target for distribution and abundance (Table 20).

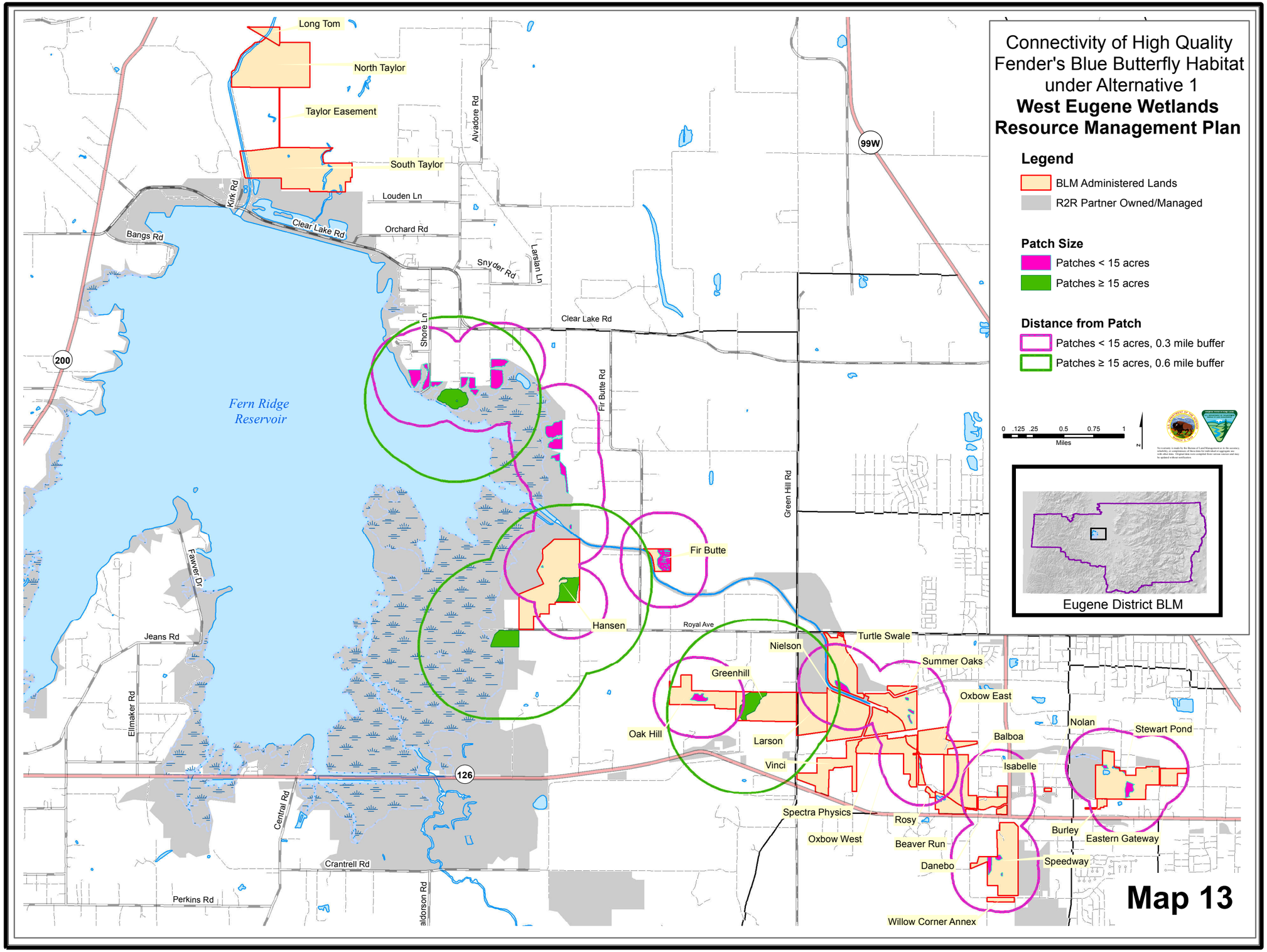
The only difference between Alternatives 2A and Alternative 2B that could potentially result in different effects on Fender's blue butterfly would be that Alternative 2B would open the Natural Maintenance Area to saleable mineral development and disposal. However, this potential difference would not result in any difference in how the alternatives would contribute to meeting recovery targets. The Fender's blue butterfly habitat in the Natural Maintenance Area would all be low quality habitat and therefore

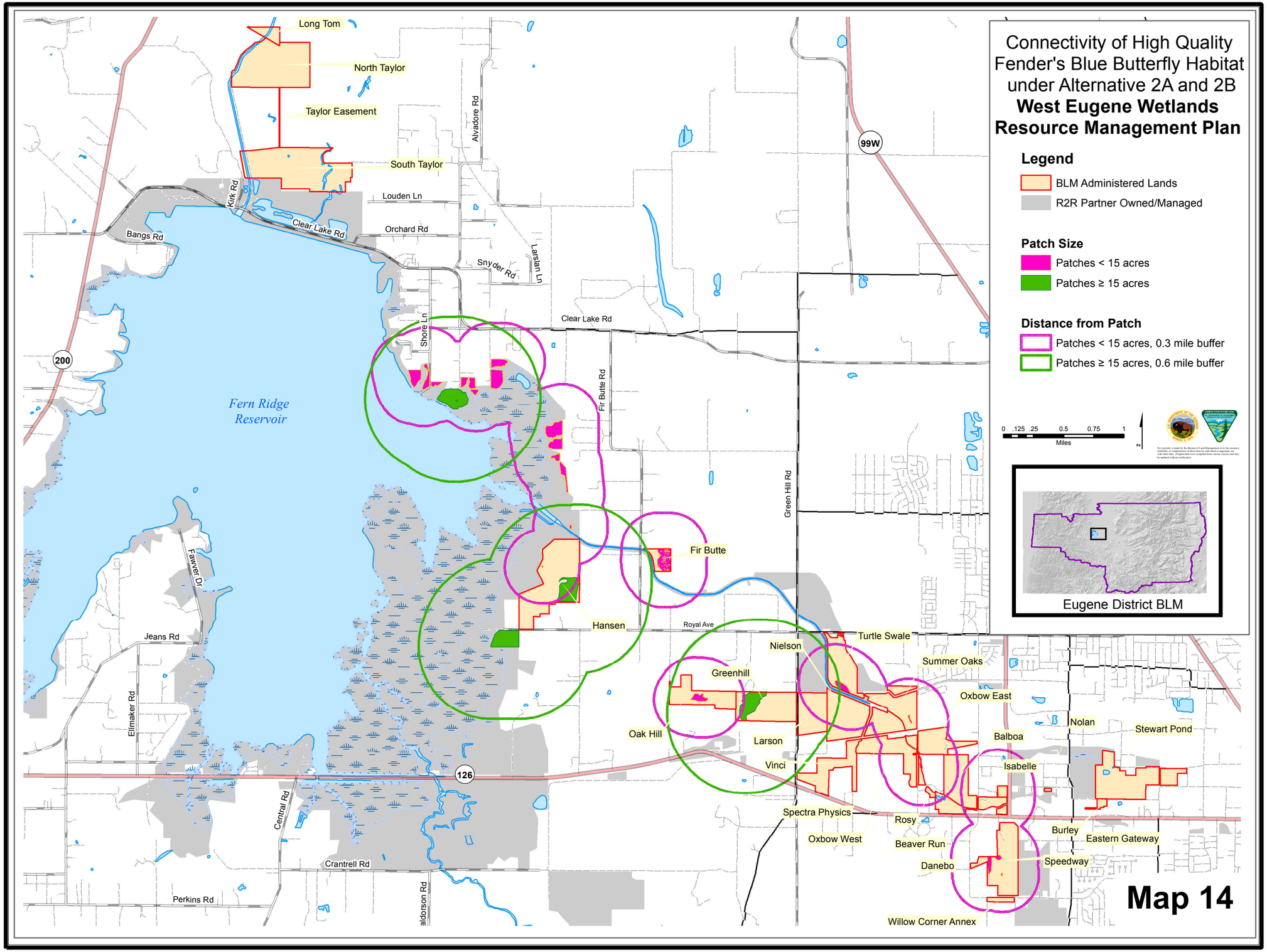
would not contribute to meeting recovery targets. None of the existing Fender's blue butterfly sites would be in the Natural Maintenance Area under Alternative 2B, and thus would not be open to saleable mineral development or disposal. Finally, as discussed below in the issue related to access, saleable minerals within the Natural Maintenance Area under Alternative 2B would generally be available relative to the anticipated demand, and decisions on saleable mineral development or disposal would be made on a case-by-case basis. Any specific effects on any low quality Fender's blue butterfly habitat would be speculative in the absence of any specific saleable mineral proposal.

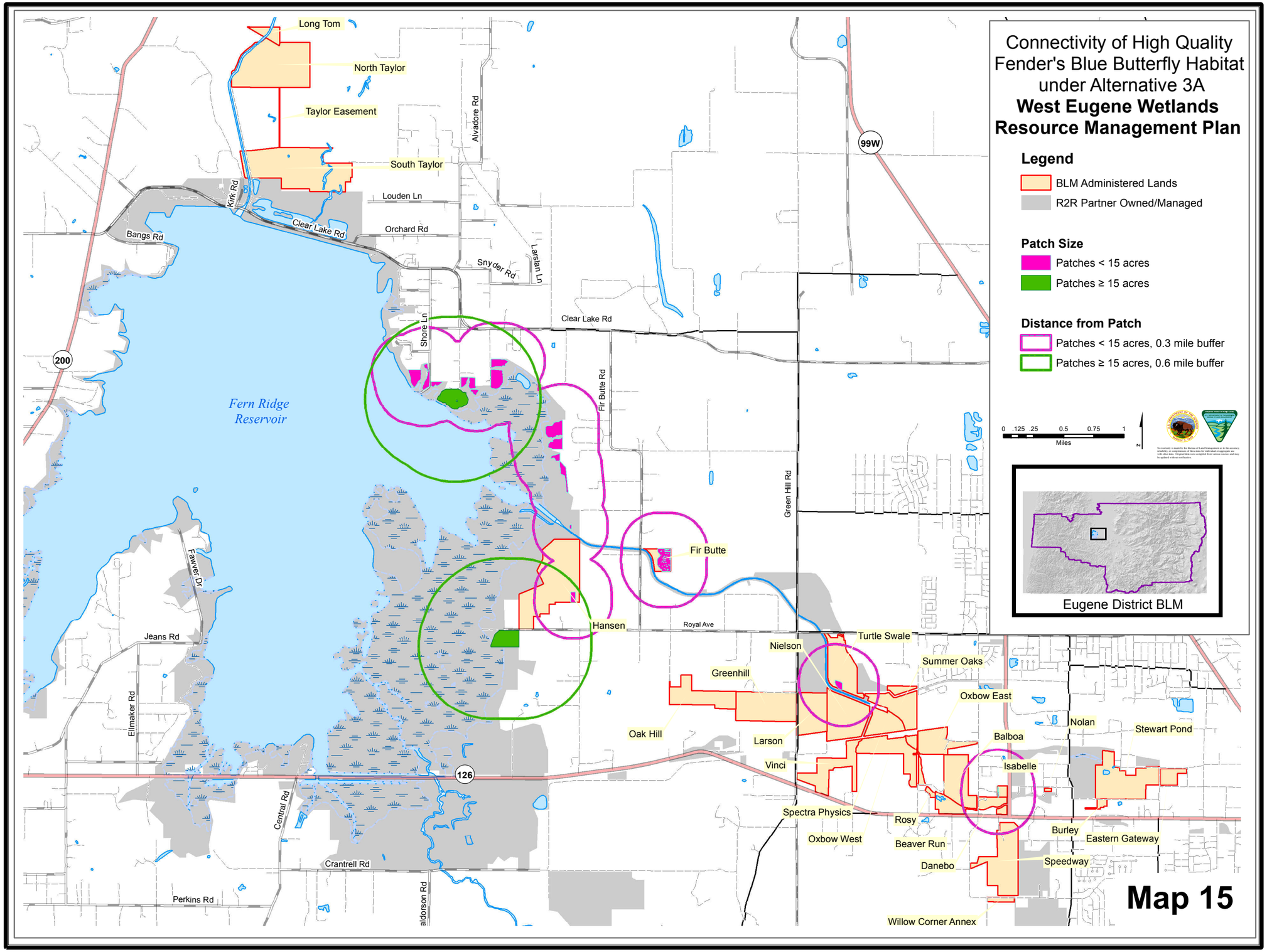
Of the total of 279 acres of high quality habitat that would develop under Alternative 3A, 16 acres would be high quality habitat with populations of Kincaid's lupine. Alternative 3A would not create any new large patches of high quality habitat with populations of Kincaid's lupine (Map 15). Alternative 3A would create small patches of high quality habitat with populations of Kincaid's lupine at Fir Butte, Hansen, Turtle Swale, and Isabelle. The small patch at Hansen would be within the threshold 0.6-mile distance from sites on the U.S. Army Corps of Engineers land to the north and west. However, the small patches at Fir Butte, Turtle Swale, and Isabelle would all be isolated. Because Alternative 3A would not create any large patches of high quality habitat with populations of Kincaid's lupine and would not create networks of connected patches, it would not provide the habitat to meet the recovery target for distribution and abundance (Table 20).

Table 20. Short-term achievement of recovery targets for Fender's blue butterfly by alternative

	Recovery targets	
	Distribution and abundance	**Habitat quality and management**
No Action	**no**	**no**
Alternative 1	yes	yes
Alternatives 2A, 2B	yes	yes
Alternative 3A	**no**	yes
Alternatives 3B, 3C	**no**	**no**


Connectivity of High Quality Fender's Blue Butterfly Habitat under Alternative 1
West Eugene Wetlands Resource Management Plan
Legend
BLM Administered Lands
R2R Partner Owned/Managed
Patch Size
Patches < 15 acres
Patches ≥ 15 acres
Distance from Patch
Patches < 15 acres, 0.3 mile buffer
Patches ≥ 15 acres, 0.6 mile buffer
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Map 13
Long Tom
North Taylor
Taylor Easement
South Taylor
Louden Ln
Orchard Rd
Clear Lake Rd
Bangs Rd
Kirk Rd
Alvadore Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
99W
200
126
Fern Ridge Reservoir
Fawver Dr
Jeans Rd
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
Fir Butte
Hansen
Royal Ave
Nielson
Greenhill
Oak Hill
Larson
Vinci
Turtle Swale
Summer Oaks
Oxbow East
Balboa
Isabelle
Nolan
Stewart Pond
Spectra Physics
Oxbow West
Rosy
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex


Connectivity of High Quality Fender's Blue Butterfly Habitat under Alternative 2A and 2B
West Eugene Wetlands Resource Management Plan
Legend
BLM Administered Lands
R2R Partner Owned/Managed
Patch Size
Patches < 15 acres
Patches ≥ 15 acres
Distance from Patch
Patches < 15 acres, 0.3 mile buffer
Patches ≥ 15 acres, 0.6 mile buffer
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Map 14
Long Tom
North Taylor
Taylor Easement
South Taylor
Louden Ln
Orchard Rd
Clear Lake Rd
Bangs Rd
Kirk Rd
Alvadore Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
99W
200
126
Fern Ridge Reservoir
Fir Butte
Hansen
Royal Ave
Jeans Rd
Fawver Dr
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
Nielson
Greenhill
Oak Hill
Larson
Vinci
Turtle Swale
Summer Oaks
Oxbow East
Balboa
Isabelle
Nolan
Stewart Pond
Spectra Physics
Oxbow West
Rosy
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex


Connectivity of High Quality Fender's Blue Butterfly Habitat under Alternative 3A
West Eugene Wetlands Resource Management Plan
Legend
BLM Administered Lands
R2R Partner Owned/Managed
Patch Size
Patches < 15 acres
Patches ≥ 15 acres
Distance from Patch
Patches < 15 acres, 0.3 mile buffer
Patches ≥ 15 acres, 0.6 mile buffer
0 .125 .25 0.5 0.75 1
Miles
N
Eugene District BLM
Map 15
Long Tom
North Taylor
Taylor Easement
South Taylor
Louden Ln
Orchard Rd
Clear Lake Rd
Bangs Rd
Kirk Rd
Alvadore Rd
Snyder Rd
Larsian Ln
Shore Ln
Fir Butte Rd
Green Hill Rd
99W
200
126
Fern Ridge Reservoir
Fir Butte
Hansen
Royal Ave
Fawver Dr
Jeans Rd
Ellmaker Rd
Central Rd
Crantrell Rd
Perkins Rd
Nielson
Greenhill
Oak Hill
Larson
Vinci
Turtle Swale
Summer Oaks
Oxbow East
Balboa
Isabelle
Nolan
Stewart Pond
Spectra Physics
Oxbow West
Rosy
Beaver Run
Danebo
Burley
Eastern Gateway
Speedway
Willow Corner Annex

How would BLM management actions affect BLM sensitive and strategic plant and animal species?

Key Points
• Short-term populations of all sensitive plants would meet restoration targets under all action alternatives. • Under Alternatives 1, 2A, 2B, and 3A, long-term increases in populations of BLM sensitive vascular plant species would contribute to achieving the habitat quality recovery target for listed plants. • Habitat for animal species that are associated with high quality prairie and savanna, such as Oregon vesper sparrow and Western pond turtle, would increase under Alternatives 1, 2A, 2B, and 3A. • Habitat for animal species associated with oak woodlands, such as Lewis' woodpecker, would decline under all alternatives.

Sensitive Vascular Plants

All action alternatives would increase the populations of Hitchcock's blue-eyed grass, white-topped aster, shaggy horkelia, thin-leaved peavine, Oregon timwort, and cluster goldweed in the planning area through population augmentation by planting of plugs or seeding. The No Action alternative would not include any systematic augmentation of BLM sensitive vascular plant species.

Suitable sites for BLM sensitive vascular plant species augmentation would be adapted from the approach described in the environmental assessment for the West Eugene Wetlands Threatened and Endangered Plant Augmentation (BLM 2011). The adaptation of that approach for BLM sensitive vascular plant species, including planting method and survival, is described in detail in the Proposed Planning Criteria and State Director Guidance for this RMP. Augmentation of white-topped aster, Hitchcock's blue-eyed grass, thin-leaved peavine, and cluster goldweed would be by planting. Augmentation of Oregon timwort would be by seeding. Augmentation of shaggy horkelia is assumed for the purpose of this analysis to be half planting and half seeding. Those descriptions are incorporated here by reference (BLM 2012a, pp. 20-21).

The current known populations of the BLM sensitive vascular species do not meet restoration targets for any of the species, except cluster goldweed, as shown in Chapter 3. Under all action alternatives, plant augmentation would result in very large short-term increases in abundances of each of these species. As a result, plant abundances in the planning area alone would exceed restoration targets for abundance for each species, at least in the short-term (Table 21). Under the No Action alternative, there would be no strategic or planned augmentation of populations of these species, so the populations would not substantially change from current population levels and would not meet restoration targets.

Table 21. Short-term populations of BLM sensitive vascular plant species in the planning area by alternative (# of plants, except as noted, rounded to the nearest thousand)

	Hitchcock's blue-eyed grass	White-topped aster (m^2)	Shaggy horkelia	Thin-leaved peavine	Oregon timwort	Cluster goldweed
No Action	1,000	<1,000	<1,000	<1,000	1,000	1,000
Alternative 1	5,726,000	2,289,000	763,000	204,000	955,000	38,151,000
Alternatives 2A, 2B	2,392,000	956,000	319,000	163,000	399,000	15,939,000
Alternatives 3A, 3B, 3C	1,241,000	496,000	166,000	39,000	208,000	8,264,000
Restoration target	15,000	7,500	15,000	1,000	15,000	15,000

As with threatened and endangered species, it is uncertain whether there would be an adequate supply of plugs and seeds of the BLM sensitive vascular plants to support the amount of plant augmentation described in the alternatives. The availability of plugs and seed would likely limit plant augmentation more than the availability of suitable sites. If the supply of plugs and seeds is inadequate, the augmentation would take longer than described here to reach the population numbers in Table 21.

The distribution of populations of BLM sensitive vascular plant species would exceed the restoration targets for number of populations for all species under all action alternatives in the short term. The abundance of augmented plants on numerous sites in conjunction with the existing populations would result in a network of connected large populations of each species within the planning area under all action alternatives in the short term. The No Action alternative, which would fail to achieve the restoration targets for plant abundance for all BLM sensitive vascular plant species, would fail to achieve the restoration target for distribution for all species.

Similar to the analysis of threatened and endangered plants, these results for abundance and distribution of BLM sensitive plants reflect short-term plant abundances; long-term survival of augmented populations (within 15 years) would differ under some alternatives, as described below. It is not possible to make quantitative estimates of long-term survival of existing or augmented populations or future natural recruitment of these plant species. Nevertheless, it is possible to make qualitative descriptions of whether overall long-term population trends would be positive, stable, or negative, based on habitat quality.

Under Alternative 1, the short-term abundance of all BLM sensitive vascular plant species would be the highest of all alternatives. The use of all management tools, including herbicides, would result in the restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities in the Prairie Restoration Area. Competition from invasive grasses and other non-native plant species would be controlled, which would help maintain augmented populations of the BLM sensitive vascular plant species. The fine-scale connectivity of high quality habitat would be the second highest among all alternatives, as described in the issue above related to plant communities. As a result of habitat restoration and maintenance, long-term survival rates of the BLM sensitive vascular plant species would be consistent with short-term survival rates, and augmented populations would be maintained over the long-term. Under Alternative 1, all existing populations of BLM sensitive vascular plant species would occur within the Prairie Restoration Area. The restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities within the Prairie Restoration Area would maintain the existing populations of BLM sensitive vascular plant species in the planning area. Long-term increases in populations of BLM sensitive vascular plant species would contribute to achieving the prairie diversity component of the habitat quality recovery target for threatened and endangered plants and would facilitate the development of pollinator networks in the planning area.

Under Alternatives 2A and 2B, the short-term abundance of all BLM sensitive vascular plant species would be the second highest of all alternatives. The use of all management tools, including herbicides, would result in the restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities in the Prairie Restoration Area and Long Tom ACEC. The fine-scale connectivity of high quality habitat would be the highest among all alternatives, as described in the issue above related to plant communities. As a result of habitat restoration and maintenance, long-term survival rates of the BLM sensitive vascular plant species in the Prairie Restoration Area would be consistent with short-term survival rates, and augmented populations would be maintained over the long-term. Under Alternatives 2A and 2B, not all existing populations of BLM sensitive vascular plant species would occur within the Prairie Restoration Area of the Long Tom ACEC. The following populations would be within the Natural Maintenance Area: 34 square meters of white-topped aster, 88 plants of shaggy horkelia, 1 plant of thin-leaved peavine, 100 plants of Oregon timwort, and 100 plants of cluster goldweed. These represent the following percentages of the known populations in the planning area: 58% of white-topped aster, 9% of shaggy horkelia, 100% of thin-leaved peavine, 9% of Oregon timwort, and 10% of cluster goldweed. These populations within the Natural Maintenance Area would likely decline over the long term, because high quality wet prairie, upland prairie, or oak savanna would not be restored in these areas. Nevertheless, the long-term increases in populations of BLM sensitive vascular plant species in the Prairie Restoration Area and Long Tom ACEC would contribute to achieving the prairie diversity component of the habitat quality recovery target for threatened and endangered plants and would facilitate the development of pollinator networks in the planning area.

Under Alternatives 3A, 3B, and 3C, the short-term abundance of the BLM sensitive vascular plant species would each be the lowest of all action alternatives. Nevertheless, the short-term abundance under Alternatives 3A, 3B, and 3C would still exceed the restoration targets for abundance.

Under Alternative 3A, the use of all management tools, including herbicides, would result in the restoration and maintenance of high quality wet prairie, upland prairie, and oak savanna plant communities in the Prairie Restoration Area. The fine-scale connectivity of high quality habitat would be the third highest among all alternatives, as described in the issue above related to plant communities. As a result of habitat restoration and maintenance, long-term survival rates of the BLM sensitive vascular plant species in the Prairie Restoration Area would be consistent with short-term survival rates, and augmented populations would be maintained over the long-term. Under Alternative 3A, not all existing populations of BLM sensitive vascular plant species would occur within the Prairie Restoration Area. The following populations would be within the Natural Maintenance Area: 24 square meters of white-topped aster, 1 plant of thin-leaved peavine, and 163 plants of cluster goldweed. These represent the following percentages of the known populations in the planning area: 41% of white-topped aster, 100% of thin-leaved peavine, and 16% of cluster goldweed. These populations within the Natural Maintenance Area would likely decline over the long term, because high quality wet prairie, upland prairie, or oak savanna would not be restored in these areas. Nevertheless, the long-term increases in populations of BLM sensitive vascular plant species in the Prairie Restoration Area would contribute to achieving the prairie diversity component of the habitat quality recovery target for threatened and endangered plants and would facilitate the development of pollinator networks in the planning area.

Under Alternatives 3B and 3C, short-term survival of augmented populations would not reflect long-term survival rates, because habitat quality would not be restored and maintained. The absence of herbicide use under Alternatives 3B and 3C would result in failure to restore sites to high quality wet prairie, upland prairie, or oak savanna habitat conditions, as described in the issue above related to plant communities. Despite the short-term increase in abundance from augmentation, the failure to restore and maintain high quality wet prairie, upland prairie, and oak savanna plant communities would lead to eventual declines in populations of the BLM sensitive vascular plant species in the planning area over the long term.

In addition to the augmentation by BLM of populations of the BLM sensitive vascular plant species, it is highly probable that other land owners within the planning area boundary will also augment populations, as detailed below, within the next ten years (T. Taylor, City of Eugene, *personal communication*, May 14, 2012; M. Benotsch, The Nature Conservancy, *personal communication*, May 17, 2012).

- Hitchcock's blue-eyed grass: The Nature Conservancy expects to seed less than one pound of seed.
- White-topped aster: The Nature Conservancy expects to seed one to two pounds of seed.
- Cluster goldweed: The Nature Conservancy expects to seed one to two pounds of seed.
- Shaggy horkelia: the City of Eugene expects to plant approximately 800 plants.
- Oregon timwort: the City of Eugene expects to seed across 160 acres.
- Cluster goldweed: the City of Eugene expects to seed across 80 acres.

As described above in the issue related to plant communities, the only reasonably foreseeable high quality prairie or savanna habitat on other land ownerships within the planning area boundary within ten years would be 94 acres of high quality upland prairie on land managed by the U.S. Army Corps of Engineers (W. Messinger, U.S. Army Corps of Engineers, *personal communication*, February 7, 2012) and 228 acres of high quality wet prairie and 3 acres of high quality upland prairie on City of Eugene land at Coyote Prairie (D. Steeck, City of Eugene, *personal communication,* August 9, 2012). Only augmentations of BLM sensitive plant species on these areas of high quality prairie and savanna habitat would provide any reasonably foreseeable long-term contribution to plant abundances of the BLM sensitive vascular plant species on other land ownerships within the planning area boundary.

BLM Sensitive and Strategic Mosses

There is incomplete information about the habitat and the effects of management actions on *Bruchia flexuosa*, *Ephemerum crassinervium*, *Ephemerum serratum*, and *Pseudephemerum nitidum*, as described in Chapter 3. It does appear that all species require bare or disturbed damp soil. Based on this information and given that these species have persisted within the planning area under the current management practices, this analysis assumes that the current management approach will continue to maintain these species in the future. For the sites on which large populations of these species occur, the current management practices include mowing and prescribed burning. Mowing improves habitat for these mosses by temporarily reducing the stature of competing vegetation, altering plant species composition, and controlling invasion by woody plant species. However, mowing creates dead plant material, or thatch, that may smother mosses. Prescribed burning also temporarily reduces the stature of competing vegetation, but also removes thatch, creating open ground and growing space for mosses. Prescribed burning may cause some mortality of mosses. However, given that these prairie-related mosses occur within ecosystems that historically experienced frequent fire, these mosses' life histories must be adapted to some amount, frequency, and intensity of burning. In addition, *Ephemerum crassinervium* and *Ephemerum serratumi* are ephemeral species, which would limit the likelihood that individuals of these species would be killed by late summer prescribed burning (J. Christy, *personal communication*, January 12, 2012).

Existing populations of BLM sensitive and strategic moss species would be maintained under the No Action alternative, because the current management practices of mowing and prescribed burning would continue to be implemented.

Under Alternatives 1, 2A, and 2B, all populations of BLM sensitive and strategic moss species would be within the Prairie Restoration Area or Long Tom ACEC, where prescribed burning would continue to be implemented, removing thatch and avoiding the smothering of mosses. All large populations of the BLM sensitive mosses would have 300-foot buffers to avoid disturbance from heavy equipment. As a result, all existing populations of BLM sensitive and strategic moss species would be maintained.

Under Alternatives 3A, 3B, and 3C, all large populations of BLM sensitive and strategic mosses would be within the Prairie Restoration Area, where prescribed burning would continue to be implemented, removing thatch and avoiding the smothering of mosses. All large populations of the BLM sensitive and

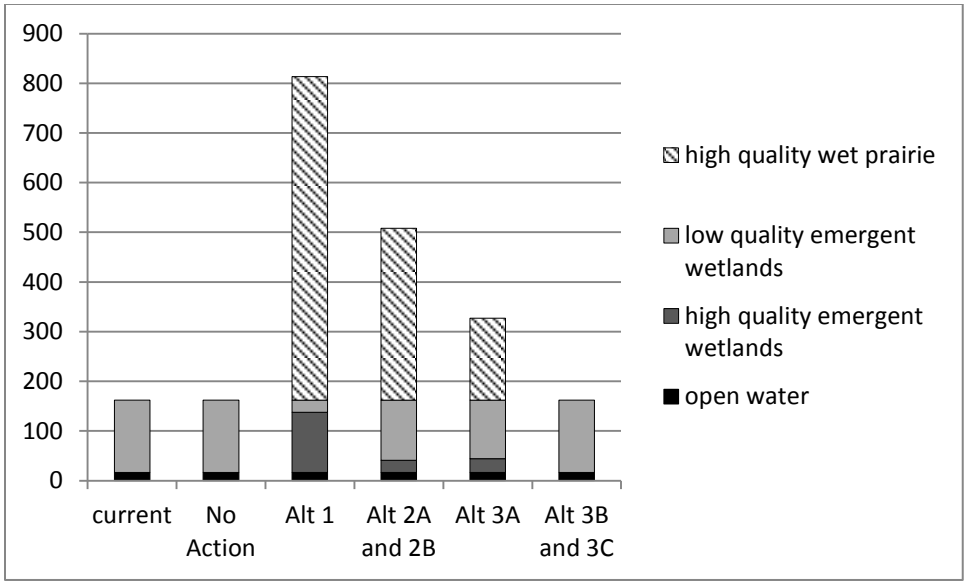
mosses would have 300-foot buffers to mitigate disturbance from heavy equipment. As a result, existing large populations of BLM sensitive and strategic moss species would be maintained. Some small populations of BLM sensitive and strategic mosses would be within Natural Maintenance Area: three small populations of *Bruchia flexuosa*; one small population of *Ephemerum crassinervium*; one small population of *Ephemerum serratum*; and two small populations of *Pseudephemerum nitidum*. These small populations of mosses would decline over time, because only occasional mowing would occur in the Natural Maintenance Area, which would lead to an increase in invasive species and a build-up of thatch. With the loss of these small populations, the total abundance of BLM sensitive and strategic mosses in the planning area would decline: *Bruchia flexuosa* would decline from 1,700 square meters to 1,600 square meters; *Ephemerum serratum* would decline from 1,100 square meters to 1,000 square meters; and *Pseudephemerum nitidum* would decline from 1,200 square meters to 1,100 square meters. The decline of *Ephemerum crassinervium* from the loss of one small population would be too small to be measured within the precision of this analysis.

BLM Sensitive and Strategic Animals

Changes in the abundance of plant communities, as described in the issues above related to plant communities and threatened and endangered species, would cause changes in the abundance of habitat for BLM sensitive and strategic animal species.

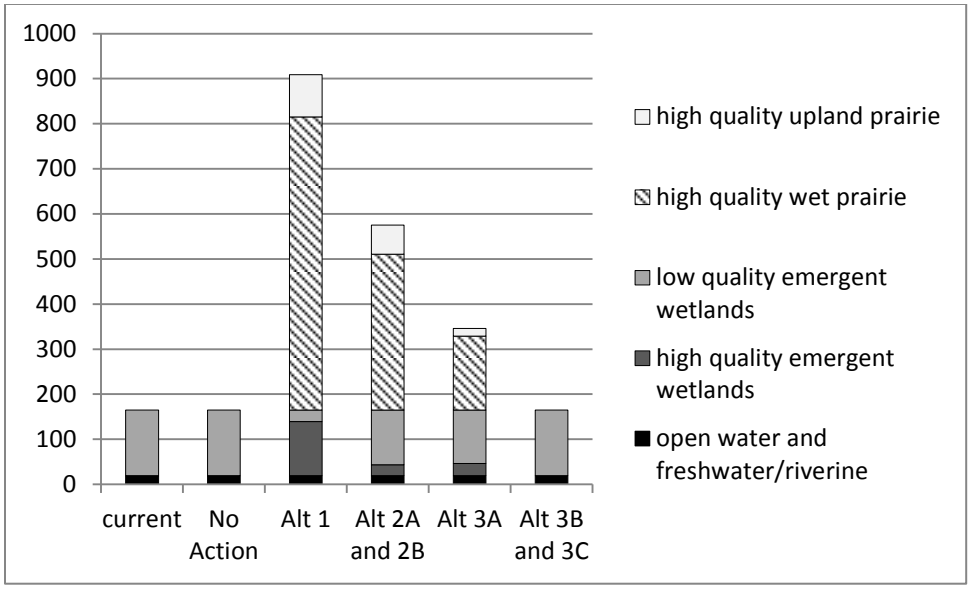
Dusky Canada goose and Aleutian Canada goose: the effects of the alternatives on these geese would not be substantively different, because these geese rely on habitat in the planning area largely for winter loafing, as opposed to more essential life functions such as feeding and reproduction. The overall availability of winter loafing habitat in the region does not appear to be a limiting factor on regional winter populations. The differences among the alternatives in effects on these geese would be driven primarily by the availability of high quality wet prairie. In this regard, Alternative 1 would benefit these geese more than other alternatives. The greater extent of high quality emergent wetlands under Alternative 1 over other alternatives also would benefit these species for the same reason (Figure 17). Specifically, the anticipated decreases in woody vegetation from wet prairie restoration would increase the ability of geese to see and avoid predators in resting areas.

Figure 17. Dusky Canada goose and Aleutian Canada goose habitat in ten years by alternative, in acres



White-tailed kite and American peregrine falcon: the effects of the alternatives on both species are primarily a function of wet prairie restoration. For the kite, the greater diversity in the plant community from both wet and upland prairie restoration would increase populations of small mammals, the kite's principal prey. The anticipated reductions in ground cover and the amount of woody vegetation also would improve prey exposure. Peregrines would respond similarly, but for a different prey base. Prairie restoration, with the retentions of open water and emergent wetlands, would improve local prey populations for American peregrine falcons, primarily aquatic and shore birds, and passerines. For both white-tailed kite and American peregrine falcon, Alternative 1 would result in the greatest increase in habitat, and the No Action alternative and Alternatives 3B and 3C would result in no increase in habitat from the current condition (Figure 18).

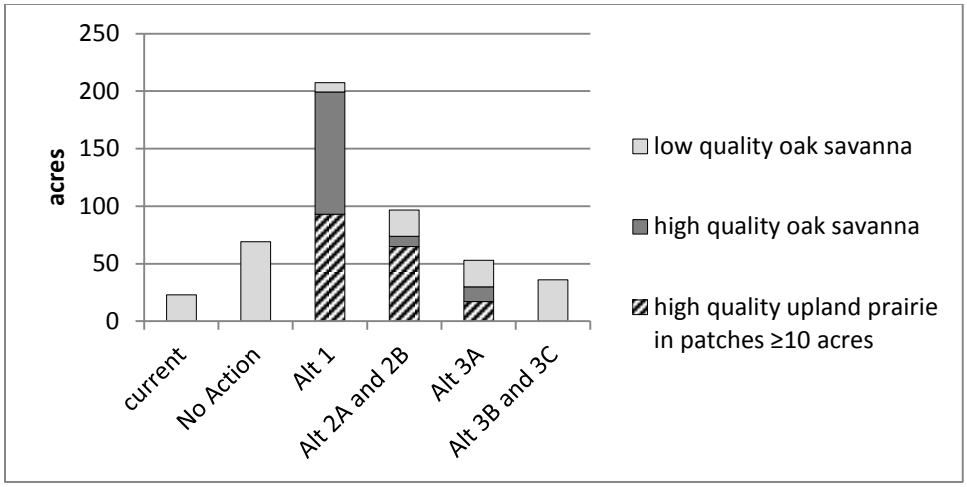
Figure 18. White-tailed kite and American peregrine falcon habitat in ten years by alternative, in acres



Grasshopper sparrow and streaked horned lark: none of the alternatives would provide high quality wet prairie and high quality upland prairie in contiguous patches of 200 acres or greater. Alternative 1 would provide the greatest amounts of high quality wet prairie and high quality upland prairie. Even though those habitats would not be arrayed in patches of 200 acres or greater, Alternative 1 would improve grasshopper sparrow and streaked horned lark habitat more than the other alternatives. The streaked horned lark also would respond to the restoration of high quality upland prairie, which would improve nesting and foraging habitat by improving plant species diversity, which in turn would improve the abundance of invertebrate prey species, and reduce both vegetative ground cover and the amount of woody vegetation, which would improve prey exposure and reduce predation risks. Alternatives 1, 2A, 2B, and 3A would create 93, 65, 65, and 17 acres of high quality upland prairie, respectively. The No Action alternative and Alternatives 3B and 3C would provide no improvement in habitat from the current conditions.

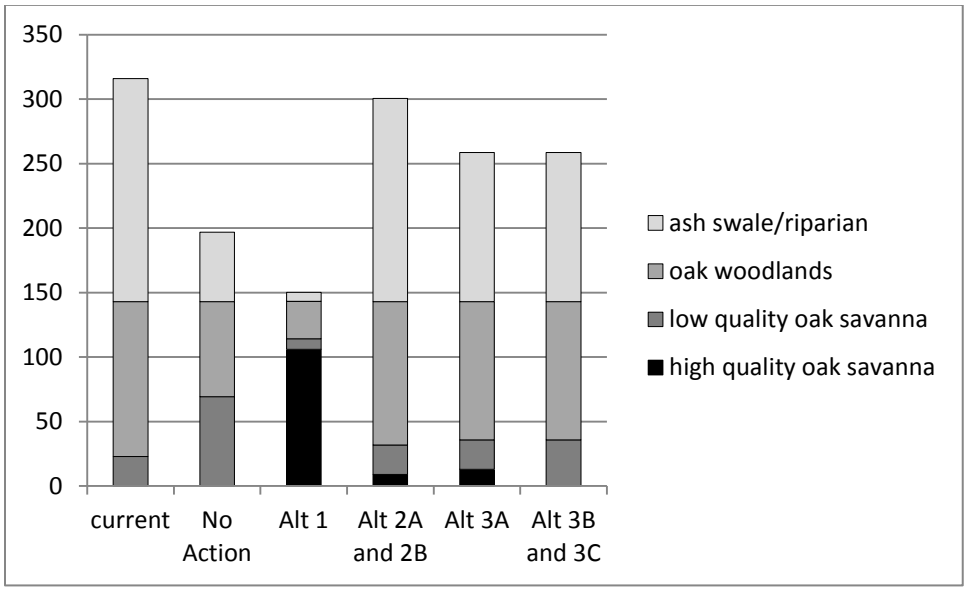
Oregon vesper sparrow: all alternatives would increase habitat from current conditions. Alternative 1 would increase habitat the most as a result of the restoration of high quality upland prairie and the extensive conversion of oak woodland to oak savanna. The No Action alternative and Alternatives 3B and 3C would create slight increases in habitat through the conversion of oak woodland to low quality oak savanna. High quality upland prairie and high quality oak savanna habitat restoration would improve the diversity of plant communities, which would improve the invertebrate prey base, and decrease ground cover and the amount of woody vegetation, which would improve prey exposure. The No Action alternative and Alternatives 3B and 3C would increase the acreage of low quality oak savanna by thinning of oak woodlands, but would create no acres of high quality oak savanna or upland prairie, resulting in minimal improvement in habitat from the current conditions (Figure 19).

Figure 19. Oregon vesper sparrow habitat in ten years by alternative, in acres



Purple martin: the effects of the alternatives on purple martin would be driven by the availability of trees which could provide nest cavities. All action alternatives would reduce habitat from current conditions. Alternatives 2A and 2B would retain the highest acreage of forested plant communities, followed by Alternatives 3A and 3B. The No Action alternative and Alternatives 1, 3B, and 3C would decrease the total amount of habitat from the current conditions, primarily by converting ash swale/riparian to wet prairie (Figure 20).

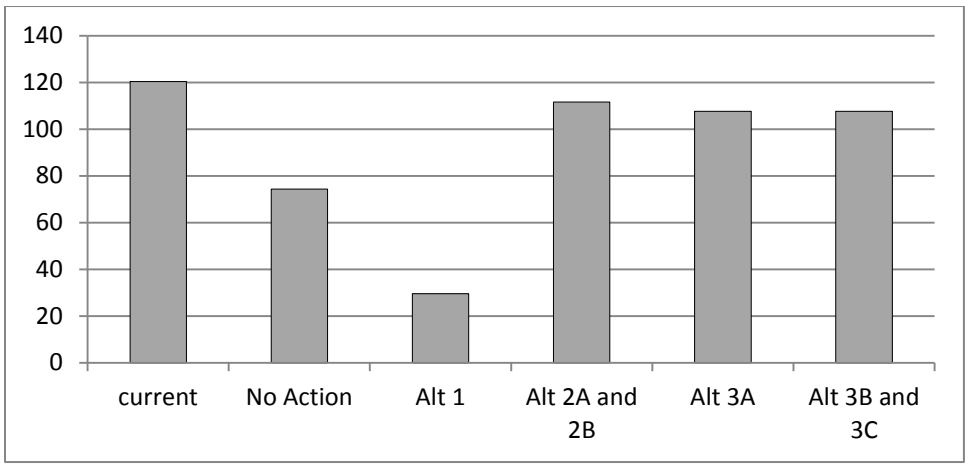
Figure 20. Purple martin habitat in ten years by alternative, in acres



Lewis' woodpecker: the effects of the alternatives on Lewis' woodpecker would be almost exclusively a function of the availability of oak woodlands, which provide both nesting structures and forging habitat.

There is less than one acre of Douglas-fir forest in the planning area, which would not change under any alternative. All of the alternatives, including the No Action alternative would decrease the acreage of oak woodland, by thinning to convert to oak savanna. Alternative 1 would result in the greatest decrease in oak woodland habitat, followed by the No Action alternative. The other alternatives would result in a slight and similar decrease in habitat compared to the current conditions (Figure 21).

Figure 21. Lewis' woodpecker habitat in ten years by alternative, in acres



Western pond turtle: the effects of the alternatives on Western pond turtle reflect three different measures of habitat: yearlong habitat, preferred nesting habitat, and connected habitat, as described in Chapter 3. The first analysis compares the total acres of freshwater/riverine, open water, and emergent wetland habitats added to the acres of high quality wet prairie and high quality upland prairie habitat within 490 feet of freshwater/riverine or open water habitat. This reflects the habitats where pond turtles are expected to occur during most of the year. The second analysis is identical to the first except that the 490-foot distance threshold increases to 650 feet. This analysis reflects preferred nesting habitat. The third analysis compares the acreage of freshwater/riverine, open water and emergent wetland habitat separated by ≤ 3,200 feet and separated by contiguous patches of high quality wet prairie, high quality upland prairie or oak community (contiguous patches may have gaps of ≤300 feet). This analysis reflects connected habitat.

Alternative 1 would create the most acreage of total yearlong habitat, preferred nesting habitat, and connected habitat of all alternatives. This is due to the creation of high quality wet and upland prairie habitats in proximity to open water and emergent wetlands. Habitat restoration would diversify prairie plant communities, which would improve foraging opportunities and provide more open ground, which would facilitate movement. Alternative 1 also would increase the acreage of high quality emergent wetlands, which would improve foraging opportunities. Alternatives 2B, 2C, and 3A would create similar amounts of total yearlong habitat, preferred nesting habitat, and connected habitat, increasing the acreage of each from the current conditions, but not as much as Alternative 1. The No Action alternative

and Alternatives 3B and 3C would not increase the acreage of total yearlong habitat or preferred nesting habitat from the current conditions, and would create no connected habitat (Table 22).

Table 22. Western pond turtle habitat in ten years by alternative, in acres

	Current	No Action	Alt 1	Alt 2A and 2B	Alt 3A	Alt 3B and 3C
freshwater/riverine	2	2	2	2	2	2
open water	17	17	17	17	17	17
low quality emergent wetlands	146	146	25	121	118	146
high quality emergent wetlands	0	0	121	24	28	0
high quality wet prairie and high quality upland prairie ≤490 feet from freshwater/riverine or open water	0	0	193	51	53	0
Total yearlong habitat	165	165	357	226	227	165
high quality wet prairie and high quality upland prairie ≤650 feet of freshwater/riverine or open water	0	0	250	70	71	0
Total preferred nesting habitat	165	165	414	255	247	165
Connected habitat	0	0	93	16	18	0

Painted turtle: the effects of the alternatives on painted turtle reflect two different measures of habitat: preferred nesting habitat and connected habitat, as described in Chapter 3. The first analysis compares the total acres of freshwater/riverine, open water, and emergent wetland habitats added to the acres of high quality wet prairie and high quality upland prairie habitat within 150 feet of freshwater/ riverine or open water habitat. This analysis reflects preferred nesting habitat. The second analysis evaluates connected habitat the same as connected habitat for Western pond turtle.

Alternative 1 would create the most acreage of preferred nesting habitat and connected habitat of all alternatives. This is due to the creation of high quality wet and upland prairie habitats in proximity to open water and emergent wetlands. Habitat restoration would diversify prairie plant communities, which would improve foraging opportunities and provide more open ground, which would facilitate movement. Alternative 1 also would increase the acreage of high quality emergent wetlands, which would improve foraging opportunities. Alternatives 2B, 2C, and 3A would create similar amounts of preferred nesting habitat and connected habitat, increasing the acreage of each from the current conditions, but not as much as Alternative 1. The No Action alternative and Alternatives 3B and 3C would not increase the acreage of preferred nesting habitat from the current conditions and would create no connected habitat (Table 23).

Table 23. Painted turtle habitat in ten years by alternative, in acres

	Current	No Action	Alt 1	Alt 2A and 2B	Alt 3A	Alt 3B and 3C
freshwater/riverine	2	2	2	2	2	2
open water	17	17	17	17	17	17
low quality emergent wetlands	146	146	25	24	28	146
high quality emergent wetlands	0	0	121	121	118	0
high quality wet prairie and high quality upland prairie ≤150 feet from freshwater/riverine or open water	0	0	77	12	16	0
Total preferred nesting habitat	165	165	242	176	181	165
Connected habitat	0	0	93	16	18	0

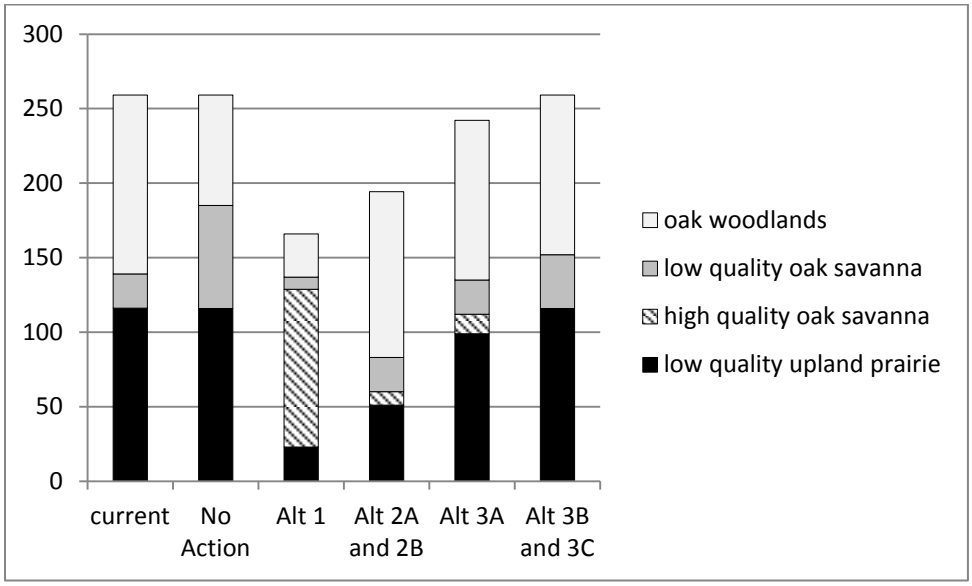
Pallid bat: none of the alternatives would alter the total acreage of habitat in oak savanna and oak woodland from the current condition. All alternatives would reduce the acreage of oak woodland from the current condition by thinning to increase the acreage of oak savanna. However, Alternatives 1, 2A, 2B, and 3A would create some acres of high quality oak savanna. More importantly, only Alternative 1 would create 352 acres of high quality wet prairie or high quality upland prairie in patches 160 acres or greater, which would provide preferred foraging habitat for pallid bat. Alternative 1 would improve pallid bat habitat substantially over the other alternatives primarily through the restoration of prairie communities. Prairie restoration would decrease ground cover and the amount of woody vegetation, reduce vegetation height and improve species diversity, which in turn would increase the invertebrate prey base and improve prey exposure. None of the alternatives besides Alternative 1 would create any patches of high quality wet prairie or high quality upland prairie 160 acres or greater. Even though Alternatives 2A, 2B, and 3A would create some acres of high quality wet prairie and high quality upland prairie, the patches would not be sufficiently large and connected to meet the habitat criteria for pallid bat.

Fringed myotis: none of the alternatives would alter the less than one acre of Douglas-fir forest in the planning area. Therefore, none of the alternatives would affect fringed myotis habitat.

Taylor's checkerspot: the alternatives would affect habitat for Taylor's checkerspot according to the amounts of and the connectivity among low quality upland prairie and oak savanna and oak woodlands. Although upland prairie restoration would reduce vegetation height and cover, potentially improving butterfly movement, and increase the diversity of nectar species, restoration also would reduce the occurrence of the non-native English plantain, this butterfly's only known larval host in Oregon. The No Action alternative and Alternatives 3B and 3C would maintain the total acres of habitat at current levels, though each alternative would shift some acres from oak woodland to low quality oak savanna. Alternative 1 would reduce habitat for Taylor's checkerspot the most of any alternative, by restoring low

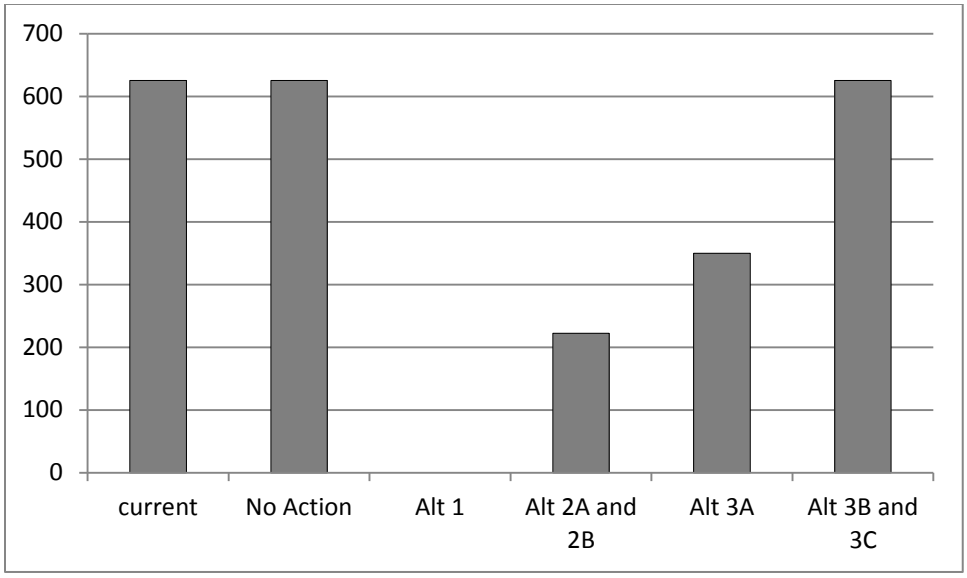
quality upland prairie to high quality upland prairie. Alternatives 2A, 2B, and 3A would also reduce habitat for Taylor's checkerspot to a lesser extent than Alternative 1 (Figure 22).

Figure 22. Taylor's checkerspot habitat in ten years by alternative, in acres



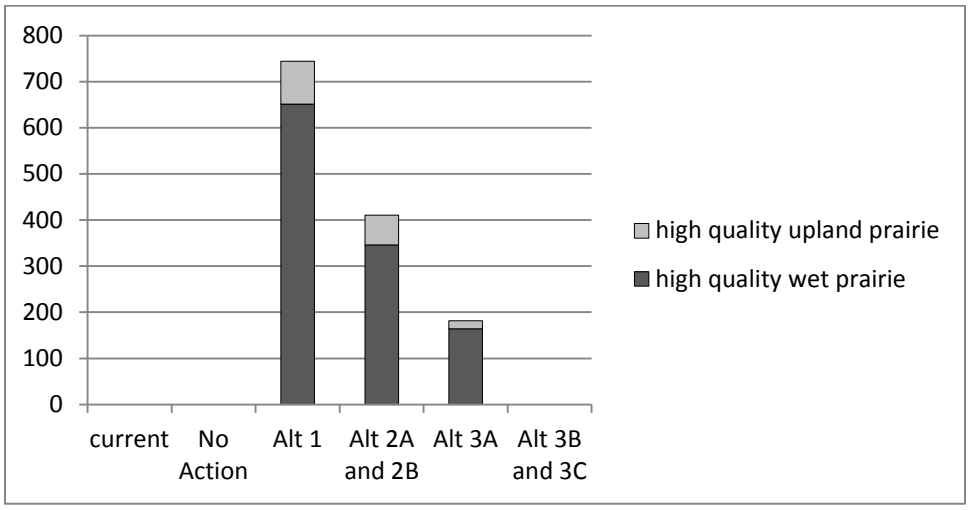
The effect of the alternatives on connectivity among patches of habitat for Taylor's checkerspot would be similar to the effect on total habitat: the No Action alternative and Alternatives 3B and 3C would maintain patches of low quality wet prairie, low quality upland prairie, and both oak communities separated by ≤4,750 feet at current conditions. Alternative 1 would result in no patches of low quality wet prairie, low quality upland prairie, and both oak communities separated by ≤4,750 feet, and Alternatives 2A, 2B, and 3A would reduce the connectivity of habitat patches from the current condition (Figure 23).

Figure 23. Connected patches of Taylor's checkerspot habitat in ten years by alternative, in acres



Dog star skipper: the effects of the alternatives on dog star skipper would reflect the amount of high quality wet prairie and high quality upland prairie habitat created. Alternative 1 would create the most habitat, followed by Alternatives 2A and 2B. Alternative 3A would create the least habitat. The No Action alternative, and Alternatives 3B and 3C would create no habitat compared to the current condition (Figure24).

Figure 24. Dog star skipper habitat in ten years by alternative, in acres



Marsh ground beetle and American grass bug: the effects of the alternatives on these species would reflect the amount of high quality wet prairie habitat created. Alternative 1 would create the most habitat, followed by Alternatives 2A and 2B. Alternative 3A would create the least habitat. The No

Action alternative, and Alternatives 3B and 3C would create no habitat compared to the current condition.

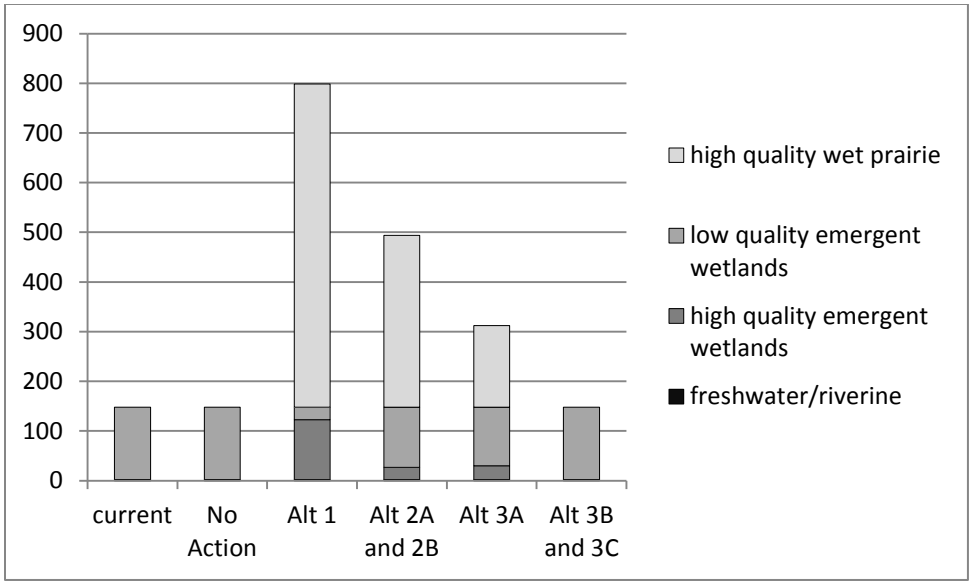
Umbrose seed bug and Arizona stink bug: none of the alternatives would alter the total acreage of habitat in oak savanna and oak woodland from the current condition. All alternatives would reduce the acreage of oak woodland from the current condition by thinning to increase the acreage of oak savanna. Alternatives 1, 2A, 2B, and 3A would create some acres of high quality oak savanna. However, there is insufficient information on the habitat needs of these species to evaluate whether these changes from oak woodland to low quality oak savanna or high quality oak savanna would have any effect on these species.

Salien plant bug: the effects of the alternatives on this species would reflect the acreage of high quality emergent wetland habitat created. The current amount of 2 acres of freshwater/riverine habitat would not change under any alternative. Alternative 1 would create 121 acres of high quality emergent wetland habitat; Alternative 3C would create 28 acres; and Alternatives 2A and 2B would create 24 acres. The No Action alternative and Alternatives 3B and 3C would create no acres of high quality emergent wetland habitat.

Martin's water measurer and Mulsant's water treader: none of the alternatives would affect habitat for these species, because both species are associated with open water, which would not change from current conditions under any alternative.

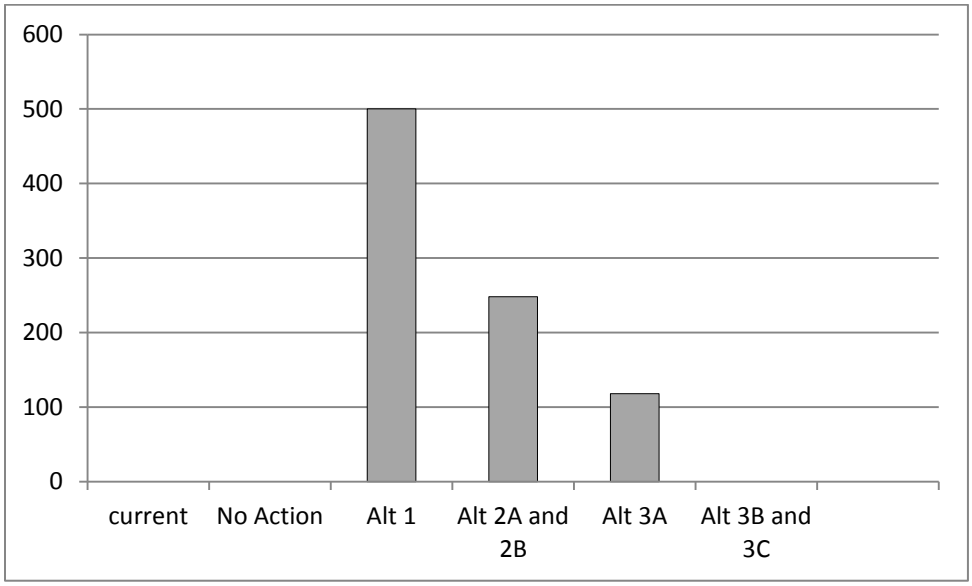
Bald Hesperian: the effect of the alternatives on bald Hesperian habitat would be reflected by the acreage of high quality wet prairie habitat that would be created. The acres of freshwater/riverine and total acres of emergent wetland habitat would not change from the current conditions under any alternative, though Alternatives 1, 2A, 2B, and 3A would restore some acres of low quality emergent wetland to high quality emergent wetland. Alternative 1 would provide substantially more total habitat than any other alternative (Figure 25).

Figure 25. Bald Hesperian total habitat in ten years by alternative, in acres



Alternative 1 would create the most acres of connected habitat for bald Hesperian, because it would create an extensive network of high quality wet prairie in the planning area. Alternatives 2A and 2B would create the second-most acreage of connected habitat, and Alternative 3A would create the third-most acreage of connected habitat. The No Action alternative and Alternatives 3B and 3C would create no connected habitat for bald Hesperian (Figure 26).

Figure 26. Bald Hesperian connected habitat in ten years by alternative, in acres



How would herbicide use affect soils, water, plants, and animals?

Key Points
• Effects of herbicide use would be limited to Alternatives 1, 2A, 2B, and 3A. The effects of herbicide use would be similar under each of these alternatives, although the areal extent of application would differ. • Concentration of herbicides in the soil would be extremely low because of the limited application methods, low rates of application, and the typical application during warm, dry conditions which would lead to breakdown of herbicides through metabolism and photolysis. • Off-site transport of herbicides by runoff, sedimentation, leaching, or drift would be extremely unlikely because of the site-species conditions of the planning area and the proposed application methods. As a result, water concentration of herbicides in the planning area would be far lower than considered in the risk assessments. • Herbicide application would result in some mortality of non-target plants, but mortality would be highly localized because of the application methods and the low likelihood of off-site transport of herbicides. • The greatest risk to non-target plants would be to aquatic plants as a result of an accidental spill of herbicides in water. However, the likelihood of an accidental spill in water would be extremely low, and the effect of any accidental spill would be highly localized. • Herbicide application would result in very limited exposure and low risk to most animals. Fender's blue butterfly adults would potentially be exposed to a grass-specific herbicide proposed for Research and Demonstration use, but it is not clear whether exposure to this herbicide would have any adverse effect on Fender's blue butterfly.

The No Action alternative, and Alternatives 3B and 3C would include no use of herbicides. Therefore, there would be no effect of herbicide use on any resources under these alternatives.

Alternatives 1, 2A, 2B, and 3A would include use of herbicides for habitat restoration and maintenance and control of noxious weed and native and non-native invasive plants. The application of herbicides under Alternatives 1, 2A, 2B, and 3A would differ only in the portion of the planning area that would be treated with herbicides. Alternatives 1, 2A, 2B, and 3A would apply the same herbicides, for the same purposes, at the same concentrations, with the same timing, and with the same methods. Alternatives 1, 2A, 2B, and 3A propose the use of the herbicides glyphosate, clopyralid, and triclopyr for control of noxious weeds and invasive plants, and the additional use of the herbicides aminopyralid and fluazifop-P-butyl (hereafter, fluazifop) for limited use for Research and Demonstration.

Glyphosate is a non-selective herbicide used to control grasses, herbaceous plants, including deep-rooted perennial weeds, and some woody plants. There are many commercial formulations of glyphosate. Only aquatic-labeled formulations would be proposed for use in the planning area. Glyphosate is applied to foliage. It is absorbed by leaves and rapidly moves through the plant.

Glyphosate prevents the plant from producing amino acids that are the building blocks of plant proteins. The plant, unable to make proteins, stops growing and dies. The U.S. Forest Service has prepared an Herbicide Information Profile which summarizes the uses and effects of glyphosate, which is incorporated here by reference (US Forest Service 1997).

Triclopyr is used to control woody plants and broadleaf weeds, but does not damage grasses. Commercial formulations include two triclopyr derivatives: triclopyr TEA (triethylamine salt) and triclopyr BEE. Only triclopyr TEA would be proposed for use in the planning area. Plants respond to triclopyr as if it were a growth hormone, interfering with normal plant growth processes. It is absorbed by green bark, leaves, roots, and cut stem surfaces and moves throughout the plant. The U.S. Forest Service has prepared an Herbicide Information Profile which summarizes the uses and effects of triclopyr, which is incorporated here by reference (US Forest Service 1996).

Clopyralid is a selective herbicide that is effective at controlling broadleaf weeds. Like triclopyr, clopyralid acts as if it were a growth hormone, interfering with normal plant growth processes. Clopyralid is applied to foliage. Clopyralid would be proposed especially for the control of composite weeds in the planning area, such as knapweeds and thistles.

The use of glyphosate, triclopyr, and clopyralid for control of noxious weeds and invasive non-native and native plants has been analyzed in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010a), to which this EIS is tiered. That state-level programmatic EIS, and the risk assessments which it incorporates by reference, provide an analytical foundation for the analysis in this EIS of the effects of glyphosate (SERA 2003a), triclopyr (SERA 2003b), and clopyralid (SERA 2004).

Aminopyralid and fluazifop were not included in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010a). Therefore, the proposed use under Alternatives 1, 2A, 2B, and 3A is limited to Research and Demonstration purposes only: demonstration plots up to 5 acres in size with a maximum of 15 acres/year of treatment for each herbicide.

Aminopyralid is a selective herbicide that is newer than clopyralid and would be used for similar purposes. Based on the risk assessment prepared for the U.S. Forest Service and National Park Service, aminopyralid appears to have even lower risk of adverse effects to terrestrial or aquatic organisms than clopyralid. That risk assessment is incorporated here by reference (SERA 2007, pp. 72-109). The BLM is proposing Research and Demonstration use of aminopyralid because of its effectiveness on a broad range of composite weed species at lower application rates than clopyralid. In addition, Research and Demonstration use of aminopyralid would help the BLM determine if aminopyralid has higher efficacy than clopyralid in controlling composite weeds due to differences in absorption, translocation or metabolism.

Fluazifop is selective, post-emergent herbicide registered for the control of perennial and annual grass weeds. Neither the U.S. Forest Service nor BLM have prepared a risk assessment for the use of fluazifop.

The risk assessment prepared by the Environmental Protection Agency (EPA 2005) and other agency analyses provide the basis for this evaluation of effects (U.S. Army Corps of Engineers 2011a; Thurston County 2011; Benton County 2010; U.S. Fish and Wildlife Service 2008). The BLM is proposing Research and Demonstration use of fluazifop, because it can selectively remove non-native grass species with little impact on non-grass plants and native fine-leaved fescue grass species. Several of the U.S. Fish and Wildlife Service biological opinions articulate the appropriateness and efficacy of this herbicide for use specifically in prairie restoration in the Willamette Valley, especially in and around Fender's blue butterfly sites. Research and Demonstration use would help the BLM evaluate the effectiveness of fluazifop in controlling non-native grasses in prairie restoration without adversely affecting native prairie plant species and Fender's blue butterflies.

The numerous analyses described above provide analyses of the effects of proposed use of these herbicides on soil, water, and terrestrial and aquatic organisms. This analysis provides additional site-specific analysis of the effect of the proposed herbicide use on soils, water, and the terrestrial and aquatic organisms in this planning area. This analysis uses GLEAMS modeling to provide site-specific modeling of the fate of applied herbicides in the planning area. This analysis conducts GLEAMS modeling of application of glyphosate, triclopyr, clopyralid, and aminopyralid, but GLEAMS modeling of fluazifop is not available at this time. However, any proposed application of fluazifop would be highly limited in areal extent, consistent with Research and Demonstration purposes of application.

This analysis then uses Worksheetmaker to calculate exposure scenarios and risk characterization associated with application of specific herbicides. The model incorporates the specific characteristics including chemical formulation, use rate, and site factors (Worksheetmaker 2006). Worksheetmaker generates Hazard Quotients which assess the likelihood of injury to groups of species under various scenarios. Hazard Quotients are defined as the ratio of the estimated level of exposure to a substance from a specific pesticide application to the reference dose for that substance or to some other index of acceptable exposure or toxicity. The resultant Hazard Quotients are then compared to a risk threshold. Hazard Quotients for groups of species that fall above the risk threshold are addressed below. More detail on GLEAMS modeling and Worksheetmaker is provided in Appendix D.

These site-specific results for herbicide exposure and risk are compared to the analytical results from the broader analyses to evaluate whether the proposed herbicide use in the planning area would result in any adverse effects to resources not already analyzed in the broader analyses.

Soils

The herbicides proposed for use under Alternatives 1, 2A, 2B, and 3A differ in their interactions with soils. Glyphosate has very high solubility, very high soil adsorption, low soil mobility, and a short half-life. Triclopyr has high solubility, low soil adsorption, is photodegradable, and has a short half-life. Clopyralid has high solubility, very low soil adsorption, very high soil mobility, and a short half-life. Aminopyralid has very high solubility, very low soil adsorption, very high soil mobility, and a long half-life (Table 24). Under Alternatives 1, 2A, 2B, and 3A, the most intensive application of glyphosate would be a broadcast foliar application, twice a year, when needed to reset the vegetation at a site. The other herbicides

would typically be applied as spot sprays, with one application on a site per year. There may be instances in which spot-spraying of the other herbicides might be conducted twice in one year on a site depending on the target weeds being treated and the amount of infestation. However, one application on a site per year would be the more typical treatment.

Fluazifop rapidly (less than one day) degrades in soil to fluazifop acid, which is much more stable in soil and water environments than the parent (EPA 2005, p.5). The highly limited extent and intensity of proposed use of fluazifop for Research and Demonstration purposes, combined with the rapid degradation of fluazifop in soil, would result in extremely low or non-existent concentrations of fluazifop in soil.

Table 24. Herbicide and soil interactions (US Forest Service 2011, p. 3.4-11; BLM 2010a; SERA 2007; SERA 2004; SERA 2003a; SERA 2003b)

	Glyphosate	**Triclopyr**	**Clopyralid**	**Aminopyralid**
Typical application	Broadcast Foliar 2 application/yr	Spot spray 1 application/yr	Spot spray 1 application/yr	Spot spray 1 application/yr
Solubility	Very high	High	High	Very high
Soil adsorption	Very high	Low	Very low	Very low
Half-life in soil	30-60 days (SERA 2003a)	46 days (SERA 2003b); 30 days (BLM 2010a)	14-29 days (SERA 2004)	89-343 days (SERA 2007)
Half-life in anaerobic soil	12-70 days	<1 day	>1,000 days	No information
Effect on soil organisms	Short-term decreases in microbial growth noted in lab study. Field studies show short-term increases in microorganisms and microbial activity	Degradation through microbial metabolism, photolysis and hydrolysis. Can be taken up by other plants as plants die	No effect on earthworms, or nitrogen fixation, nitrification, and degradation of carbonaceous material	Short-term (1 day), increases in nitrate/mineral, nitrogen observed at concentrations far above typical application rate. Degrades rapidly in sunlit water (photolysis)
Summary	Low soil mobility, short half-life, aquatic formulations are low risk to aquatic species Suggested no hazard to soil microorganisms	Photodegradable. Resistant to abiotic/biodegradati on. Suggested no hazard to soil microorganisms	Very high soil mobility, short half-life, low risk to aquatic organisms Suggested no hazard to soil microorganisms	Very high soil mobility, long half-life, low risk to aquatic organisms Unknown hazard to soil microorganisms

On sites where herbicides would be applied under Alternatives 1, 2A, 2B, and 3A, herbicide concentrations in the soil would be extremely low (Table 25). The limited areal extent of application

that would occur during proposed herbicide treatment would minimize herbicide concentrations to extremely low levels. Most herbicide applications would be by spot treatments, limiting the amount of herbicide reaching the soil and the areal extent of the application. The exception would be the use of glyphosate for "reset" of parcels that have high density of noxious weeds and invasive species and few if any native prairie species. Though there is the possibility that the imogolite clay may increase herbicide persistence due to the high adsorptive quality in some areas, the herbicide treatments would occur during the growing season when microorganisms would metabolize the herbicides. Estimates of the depth of soil penetration in GLEAMS assumes that when a chemical moves into the soil, the chemical is adsorbed onto the organic carbon and is uniformly mixed with the total soil mass in that layer. Water transmission of herbicides in the soils in the planning area would be very slow, being impeded by the dense clay and its molecular structure. As a result, herbicide penetration would probably not be as deep in the soil as the GLEAMS results suggest.

Table 25. Average herbicide soil concentration and soil penetration

herbicide	concentration at 12" (ppm)	concentration at 36" (ppm)	depth of soil penetration (inches)
glyphosate	0.30	0.10	8
triclopyr	0.02	0.07	48
clopyralid	0.06	0.02	48
aminopyralid	0.01	<0.01	48

The half-lives of aminopyralid, clopyralid, glyphosate, and triclopyr indicate no or very low residues would remain in the soil between applications and would be unlikely to accumulate between repeated treatments. As a result, there would be no difference in persistence levels noted in the risk assessments and the persistence levels under the site-specific conditions of the planning area.

There is limited data available on amount of herbicide that is toxic to soil organisms. The BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement summarizes the potential effects of herbicides on soil macro and microorganisms, and that discussion is incorporated here by reference (BLM 2010a, pp. 174-188).

Water

Herbicide use may create the potential for herbicide transport to steams, where herbicides could affect water quality for aquatic organisms. Potential routes for off-site movement of herbicides under typical conditions are runoff, sedimentation, groundwater leaching, drift, direct application, and accidental spill, which are discussed in detail in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010a, pp. 198-202). That discussion is incorporated here by reference. Although there are many potential routes for off-site movement of herbicides in typical situations, there are few reasonably foreseeable routes for off-site movement of herbicides in the planning area because of the site-specific conditions, as described below.

Runoff would be unlikely on most sites in the planning area, as described in Chapter 3. Many of the prairie sites that would be proposed for herbicide treatments are not adjacent to streams and would have minimal runoff only during large storm events through ditchlines. Much of the overland flow becomes ponded, creating large areas of standing water. There are few ditchlines or direct delivery points into streams on most prairie sites. This lack of delivery points would reduce the potential for herbicide transport to water much below that which was modeled. The GLEAMS modeling overestimates the slope of many of the prairie sites and the possibility of direct delivery points to streams, and thus overestimates the potential for delivery to a stream.

Sedimentation would be unlikely to occur from prairie sites. The exceedingly low slope and the lack of connectivity to stream or ditches delivering to a stream are important site-specific conditions that prevent any potential for sediment to reach streams. The massive clay has particle cohesive properties that are not easily entrained. Where bare soil is present, it typically exhibits itself with hummocky areas including vegetation growing on mounds. Though the clay is at the surface, the mounded roots capture silt as water drains through lower areas. Sediment erosion from these areas would be highly unlikely. There is one potential, site-specific avenue for sedimentation to transport herbicides to a stream: the prairie site at Speedway adjacent to Willow Creek has areas of exposed clay which exhibits large cracks in the summer. During the first autumn rains, there would be the potential for piping of water and soil through these cracks. For those herbicides which attach to clay, this presents a potential avenue for herbicides to reach the stream. Most herbicide treatments would be spot sprays, reducing the potential for sediment to transport herbicides off-site. With a broadcast foliar treatment, the standard operating procedure of maintaining an unsprayed buffer along drainage ways would reduce any potential transport.

Leaching into the groundwater would be unlikely because of the specific properties of the imogolite clay that underlies the prairie sites. The clay is dense, massive, and extensive, as described in Chapter 3. Groundwater contamination would be unlikely because water transmission would be very slow through the dense clay. Herbicides with adsorptive characteristics, such as glyphosate, would bind to this clay, resisting downward movement in the profile and persist until they were metabolized.

Drift of herbicides is addressed in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010a, pp. 88-89), which explains that drift would provide a potential route for herbicide exposure for non-target species and for herbicide transport to streams. That discussion is incorporated here by reference. However, drift would be minimal under the herbicide applications methods proposed in the planning area, such as low boom, spot spraying, wiping, and hack and squirt. No aerial application of herbicides would be proposed. The drift exposure scenarios in the risk assessments greatly overstate the potential exposure from drift for the proposed herbicide application in the planning area.

The uncertainties associated with accidental spills or misapplication of herbicides is addressed in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement

(BLM 2010a, pp. 116-117). That discussion is incorporated here by reference. The chance of an accidental spill of herbicides reaching a stream in the planning area would be greatly reduced by the lack of proximity of most sites to streams. The chance of an accidental spill reaching a stream in the planning area would be further reduced by the timing of herbicide application. Most herbicides would be applied during summer, when low flows would occur in streams and creeks near most sites, as described in Chapter 3, reducing the likelihood of an accidental spill directly into the stream.

In the unlikely event of an accidental spill directly into Amazon Creek, the Amazon Diversion Channel, or Willow Creek, effects on water quality would be highly localized. Those herbicides that adsorb readily to sediment (e.g., glyphosate) would attach to particles directly in the stream of water, because all three channels have streambeds with fine particle sizes conducive to adsorption. During summer months, the sun and the warm water temperatures of all three creeks would rapidly degrade those herbicides sensitive to photolysis and hydrolysis, such as triclopyr and aminopyralid.

A spill directly into Amazon Creek, the Amazon Diversion Channel, or Willow Creek would result in water quality effects localized to the spill area. In Amazon Creek and the Amazon Diversion Channel, water flows are very low during the summer (typically less than 1 cubic feet per second), and flows are regulated by weirs, which would slow the downstream movement of any spilled herbicide. Only the Fir Butte site is adjacent to the Amazon Diversion Channel below the location of the weir. The fine particle size substrate, high summer temperatures of the water, and sunlight in the unshaded channels would result in rapid attachment or degradation of the herbicides. In Willow Creek, minimal summer flows would result in very slow downstream movement of any spilled herbicide, allowing for adsorption of spilled herbicide by sediments and rapid degradation because of the high water temperatures and sunlight in the unshaded channel.

An accidental spill into the Long Tom River, although highly unlikely, could occur associated with herbicide applications on the North Taylor, South Taylor, or Long Tom sites. The Long Tom River channel has higher water flows than the creeks, and there are no impeding weirs. This would lead to further travel of any spilled herbicide than in the other creeks. However, a spill would be more diluted by the higher water flows, and would be adsorbed by fine sediments and degrade in the unshaded channel. There is one small side channel of the Long Tom River on South Taylor as well as a smaller Coyote Creek channel that flows through the southeast corner of the site. These channels have exceedingly low flow during the summer months. An accidental spill would remain localized in these channels due to adsorption to fine particle sediments, and degradation by photolysis and hydrolysis.

Proposed use of fluazifop for Research and Demonstration purposes would not result in any measurable effect on water quality because of the highly limited extent and intensity of proposed herbicide use and the site-specific conditions in the planning area. Under generic site conditions at agricultural rates of application (which would be much more extensive and intense than the Research and Demonstration use proposed here), the risk assessment conducted by the U.S. Environmental Protection Agency modeled acute surface water drinking water concentrations of fluazifop acid of 7.5 parts per billion and chronic concentrations of 3 parts per billion, which are below the agency's level of concern (EPA 2005,

pp. 5-6). As described above, the site-specific conditions in the planning area would result in much less potential for herbicide transport to water than typical site conditions, and the proposed application would be much less extensive and intense than modeled in the risk assessment. Therefore, any potential effect of fluazifop application on water quality would be even lower than the effects described in the risk assessment, which found effects below the agency's level of concern.

This analysis models the fate of herbicide application of glyphosate, triclopyr, clopyralid, and aminopyralid on the sites in the planning area that would have the greatest potential for herbicide delivery to a stream: Nielson, Spectra Physics, Summer Oaks and Turtle Swale. For these most susceptible sites, GLEAMS modeling was conducted for each herbicide for the greatest potential application extent and rate. GLEAMS modeling of herbicide application on these sites, which would be the most susceptible sites in the planning area, demonstrates that the herbicide concentrations transported to streams would be extremely low (Table 26). These modeled concentrations of herbicide reaching streams in the planning area would be far lower than the expected concentration values from the risk assessments for glyphosate, triclopyr, clopyralid, and aminopyralid, ranging approximately from 1/100th to 1/10,000,000th the concentrations from the risk assessments, which analyzed typical application rates under generic sites parameters.

Table 26. Average herbicide concentrations in water from risk assessments under generic conditions and this analysis under site-specific conditions[11]

	peak/acute concentration in stream (ppm)		average long-term/chronic concentration in stream (ppm)	
herbicide	Risk Assessment	this analysis	Risk Assessment	this analysis
glyphosate	0.074	<0.001	0.011	<0.001
triclopyr	3.200	<0.001	0.013	<0.001
clopyralid	0.020	<0.001	0.007	<0.001
aminopyralid	0.040	<0.001	0.019	<0.001

Because the modeling results originate from the most susceptible sites under the heaviest proposed herbicide application scenarios in the planning area, and would result in far lower water concentrations of herbicides than analyzed in the risk assessments, any possible effects on water quality from herbicide use in the planning would be lower than those effects analyzed in the risk assessments for all five herbicides, and the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010a), which relied on those risk assessments for glyphosate,

[11] The modeling of stream concentration in this analysis provides much more precise outputs than presented in this table (e.g., 0.0000000018 ppm for long-term concentration of triclopyr). This table does not present these more precise numbers to maintain consistent presentation of data comparable to the risk assessment numbers, and to avoid presenting precision beyond the accuracy of the modeling assumptions. The exact model output numbers are available at the BLM Eugene District Office, 3106 Pierce Parkway, Springfield, Oregon.

triclopyr, and clopyralid. Given the low level of adverse effects on water quality identified in the risk assessments and the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010a) for these herbicides, there would be no meaningful effect on water quality of this proposed herbicide use on the most susceptible sites in the planning area. On other sites in the planning area, herbicide concentrations transported to streams would be even lower or non-existent. As a result, there would be no acute or chronic effects to water quality from herbicide use in the planning area.

Plants

Because herbicide applications are designed to kill plants, there would inevitably be some adverse effects on adjacent non-target vegetation. The general effects of herbicide application on non-target vegetation are analyzed in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement under typical application and generic site conditions, and that analysis is incorporated here by reference (BLM 2010a, pp. 144-156).

The analysis in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement describes that herbicide effects on non-target plants depend on (but are not limited to) the herbicide used, its selectivity, application rate, concentration, relative toxicity to the plants in the treatment area, likelihood of exposure, timing and method of application, environmental conditions during application and plant stage of growth. Herbicide application affects non-target plants through direct application overspray, off-site movement, or accidental spills. Potential impacts include plant mortality, reduced productivity, and abnormal growth. Risk to non-target plants on other sites from surface runoff and movement through soil is influenced by precipitation rate and timing, soil type and application area. Measures taken to limit exposure, such as selective application methods (e.g., spot spraying or wiping), typical application rates that are less than the maximum allowed on the label, drift reduction agents, and application restrictions based on environmental conditions (wind, precipitation, temperature, etc.) to reduce the off-target movement of herbicides.

As described above under Soils and Water, the potential for off-site transport of herbicides in the planning area is extremely low or non-existent. As a result, there would be no effects of herbicide application on non-target vegetation as a result of off-site transport of applied herbicides. Effects on non-target vegetation would be limited to the immediate vicinity of the treated site, other than in the case of an accidental spill, and would be minor in intensity, as described below.

Exposure of non-target vegetation to glyphosate from direct spray would pose a moderate to high risk to plant species that are susceptible to the herbicides and low to moderate risk to tolerant plant species (BLM 2010a, Table 4-13). In addition, one field study suggests that drift from glyphosate could affect long-term sustainability of populations of lichens and bryophytes (BLM 2010a, p. 147). Even less toxic, aquatic formulations of glyphosate would be likely to damage susceptible species of non-target aquatic macrophytes (SERA 2003a, p. 201). Algae appear to be the group of non-target aquatic organisms most susceptible to glyphosate (SERA 2003a, p. 202). The risk assessment indicates that accidental spills would pose a moderate risk to aquatic macrophytes. As described above under Water, the likelihood of

accidental spills in water would be extremely low, and the effect of any accidental spill would be highly localized.

Typical applications of triclopyr would be direct basal applications and hack and squirt applications on woody plant species. These application methods would result in very little if any exposure of non-target vegetation as a result of normal application. Triclopyr has been found to decrease the relative long-term abundance and diversity of lichens and bryophytes under aerial application, but aerial application would not be used in the planning area. Aquatic stream plants would be at low risk from routine acute exposure to triclopyr TEA at the maximum application rate; potential effects on aquatic stream plants would therefore be lower than this low risk for the typical rates which would be used in the planning area. For long-term exposures, there would be no predicted risk to aquatic plants associated with triclopyr TEA applications, even at the maximum application rate. An accidental spill of triclopyr TEA would pose a high risk to susceptible aquatic macrophytes and algae. As described above under Water, the likelihood of an accidental spill in water would be extremely low, and the effect of any accidental spill would be highly localized.

Effects to non-target vegetation from normal application of clopyralid and aminopyralid would be limited to susceptible plants species in or very near to the treatment area (BLM 2010a, p. 145). Clopyralid and aminopyralid are relatively non-toxic to aquatic plants. Accidental spills may result in temporary growth inhibition of aquatic plants; spills would present a high risk to susceptible aquatic macrophytes and a low risk to susceptible algae species. As described above under Water, the likelihood of accidental spills in water would be extremely low, and the effect of any accidental spill would be highly localized.

Fluazifop is a grass-specific herbicide which would have little adverse effect on non-target vegetation other than grasses (USFWS 2008, p. 30). Even among grasses, several important native grass species in the planning area are not strongly affected by fluazifop: native fine-leaved fescues are resistant to fluazifop, and the native tufted hair-grass (*Deschampsia caespitosa*) is at least moderately resistant to fluazifop (U.S. Army Corps of Engineers 2011, pp. 7-8; Schultz et al. 2011, p. 373). The limited use for Research and Demonstration, combined with selectivity of fluazifop, would result in little adverse effect on non-target vegetation.

To minimize effects to non-target plants, any herbicide application would employ standard operating procedures, mitigation measures and conservation measures outlined in the BLM Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement and the associated Record of Decision (BLM 2007a, Volume 2, pp. 257-468; BLM 2007b, pp. 3-74), which have been adapted for the specific conditions in the planning area and are described in Appendix E). These measures are designed to minimize risk to non-target species or plant communities. The application of these measures in the planning area would result in effects to non-target vegetation, other than Special Status plant species, consistent with the analyses in the BLM Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement and the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement, to which this analysis is tiered. Site-specific conditions in the

planning area and the more limited proposed application of herbicides in the planning area, as detailed above, ensure that the effects on non-target vegetation, other than Special Status plant species, would not exceed the adverse effects described in those analyses.

The only relevant standard operating procedures, mitigation measures and conservation measures outlined in the BLM Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement and the associated Record of Decision that would not be employed by the alternatives that propose herbicide use would be those regarding avoiding sites with BLM sensitive plants or listed plants, including the buffer distances for listed plants (BLM 2010a, pp. 155-156). Avoiding using herbicides on the sites occupied by these listed plants would preclude using herbicides for the very purpose of the proposed herbicide use: to restore and maintain habitat for the listed plants. Instead, the alternatives that propose herbicide use would employ the standard operating procedures and best management practices described in the following documents related to Willamette Valley prairie restoration and management of listed plant species, which are incorporated here by reference and described in Appendix E:

- Benton County Prairie Species Habitat Conservation Plan (Benton County 2010, Appendix J, pp. 1-11);
- U.S. Fish and Wildlife Service Programmatic Formal Consultation on Western Oregon Prairie Restoration Activities, Biological Opinion (USFWS 2008, pp. 8-12, 29-32);
- U.S. Fish and Wildlife Service Biological Opinion on U.S. Army Corps of Engineers Program of Management Activities for Rare Plants/Insects at Fern Ridge Lake Consultation (USFWS 2011a, pp. 3-6);
- U.S. Fish and Wildlife Service Willamette Valley National Refuge Complex, Draft Comprehensive Conservation Plan and Environmental Assessment (USFWS 2011b, pp. 6-6 – 6-11; Appendix F-1 – F-69);
- U.S. Fish and Wildlife Service Intra-Service Programmatic Biological Assessment for the Fish and Wildlife's Western Oregon Prairie Restoration Activities (USFWS 2008, pp. 8-12).

Employing the measures in these documents would lessen or avoid potential short-term adverse effects to threatened and endangered plant species and BLM sensitive plant species, which could include plant mortality, reduced productivity and abnormal growth, primarily to prairie vegetation which surrounds the target species where control is desired. The long-term positive effects of herbicide use would include the removal of non-native or native invasive species, restoring the distribution and abundance of native prairie species. This would reduce plant competition for limited resources between listed species and non-native or invasive non-native plants; restore prairie vegetation structure; and improve pollinator function. These long-term effects would improve overall growing conditions for the listed plants.

The U.S. Fish and Wildlife Service Programmatic Formal Consultation on Western Oregon Prairie Restoration (USFWS 2008) assessed effects of herbicide use for prairie restoration on Willamette daisy, Kincaid's lupine, Bradshaw's lomatium, and golden paintbrush and concluded that minimal risk of exposure to listed species could occur. The biological opinion concluded that application and timing restrictions would ensure that listed plants would typically have senesced for the year, thereby

minimizing or completely avoiding any adverse effects to listed plants from applying triclopyr and glyphosate. (For example, wipe-on applications would be allowed when listed plants are actively growing, and spray applications would be allowed when listed plants are dormant). The biological opinion further concluded that use of fluazifop would have no adverse effect on listed plants and their designated critical habitat. That biological opinion concluded that the effect of herbicide applications on designated critical habitat for Kincaid's lupine and Willamette daisy would be a short-term reduction in some primary constituent elements of critical habitat, including the temporary reduction in the cover of native prairie species. However, herbicide applications would result in clear long-term benefits to the listed species and their designated critical habitat by restoring prairie habitat and controlling invasive woody species and non-native plants (USFWS 2008, pp. 29 -31). That analysis is incorporated here by reference.

The U.S. Fish and Wildlife Service Biological Opinion on Expanded Activities under the U.S. Army Corps of Engineers' Program of Management Activities for Rare Plants and Insects at Fern Ridge Lake in Lane County, Oregon, also concluded that the potential for short-term adverse effects from herbicide application to listed plants would be minimal, while the long-term effect would be to contribute to the restoration and recovery of Kincaid's lupine and Fender's blue butterfly and associated habitat. The biological opinion outlines the effects of the proposed herbicides along with specific mitigations to reduce risk of adverse impacts from use of glyphosate, triclopyr, clopyralid, aminopyralid, and fluazifop (USFWS 2011a, pp. 4 - 6). That analysis is incorporated here by reference.

The effects of the proposed herbicide use on listed species and their designated critical habitat in the planning area would be the same as the effects addressed in the U.S. Fish and Wildlife Service Programmatic Formal Consultation on Western Oregon Prairie Restoration and the U.S. Fish and Wildlife Service Biological Opinion on Expanded Activities under the U.S. Army Corps of Engineers' Program of Management Activities for Rare Plants and Insects at Fern Ridge Lake in Lane County, Oregon, because:

- the herbicide use proposed in the planning area would employ similar measures as in those opinions;
- the purpose of herbicide use would be that same as in those opinions;
- the listed plant species in the planning area are the same species as those addressed in those opinions; and
- the site conditions in the planning area are similar to those addressed in those opinions.

Because the BLM sensitive plant species in the planning area have the similar general habitat requirements and similar life histories as the listed plants, the effects of herbicide use on BLM sensitive plant species would be similar to the effects on listed plant species.

Animals

The general effects of herbicide application on animals are analyzed in the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement under typical application and generic site conditions, and that analysis is incorporated here by reference (BLM 2010a, pp. 220-240; 246-258). That analysis concludes that terrestrial animals could be exposed to applied herbicide

from direct spray, the ingestion of contaminated material, or indirect contact with contaminated vegetation. Aquatic animals could be exposed to herbicides approved for aquatic use and from off-site drift or runoff from terrestrial herbicides or accidental spills. Herbicides in general have the potential to directly harm wildlife through toxic reactions, which can include death, damage to organs, changes to body weight or growth rates, reduced reproduction, reduced survival of offspring, increased risk of predation, and behavioral (sub-lethal) changes that reduce fitness. Herbicide effects on animals depend on (but are not limited to) the herbicide used, application rate, concentration, likelihood of exposure, timing and method of application, and environmental conditions during application.

As described above under Soils and Water, the potential for off-site transport of herbicides in the planning area is extremely low or non-existent. As a result, effects on animals would be limited to the immediate vicinity of the treated site, other than in the case of an accidental spill, and would be minor in intensity, as described below.

Glyphosate toxicity to most groups of animals is classified as very low, practically non-toxic, or non-toxic (BLM 2010a, p. 247; U.S. Forest Service 1997, pp. 4-5). Effects of glyphosate exposure on animals depend in part on the formulation of glyphosate analyzed. The proposed use of glyphosate would be limited to aquatic formulations of glyphosate. These formulations do not contain the surfactant POEA, which is toxic to aquatic species and amphibians (SERA 2011, pp. 11, 133-134, 145-147; BLM 2010a, pp. 247-248). The risk assessment for glyphosate concludes that these aquatic formulations of glyphosate have low toxicity (SERA 2011, pp. 11-12). Under typical application rate, aquatic formulations of glyphosate pose little risk to fish, except in the case of an accidental spill, which could pose a low risk to susceptible invertebrates and a low to moderate risk to susceptible fish (BLM 2010a, p. 226). As described above under Water, the likelihood of accidental spills in water would be extremely low, and the effect of any accidental spill would be highly localized. In addition, as described in Chapter 1 under issues considered but not analyzed in detail, few of the streams in the planning area have native fish species. The U.S. Fish and Wildlife Service summarized information on the effect of glyphosate on Fender's blue butterfly in USFWS 2011a (p. 18), which is incorporated here by reference: research in sites with Fender's blue butterfly found that fall application of glyphosate had no detectable effect on larval abundance compared to unsprayed controls, either because larvae were resistant to these chemicals or because they were protected by existing vegetation that covered them.

Proposed applications of triclopyr in the planning area would generally be spot spraying or direct basal applications on woody plant species, which would limit direct exposure of animals as a result of normal application. There would be a low risk from acute exposure of large mammals from consumption of contaminated short grass, and a low risk from chronic exposure of large mammals from consumption of contaminated short grass, broadleaf foliage, and fruit. There would be a low risk from acute and chronic exposure of small birds from consumption of contaminated short grass. The typical application methods of triclopyr in the planning area would limit the contamination of non-target vegetation, and the rapid photodegradation of triclopyr after application would limit the risk of potential exposure for large mammals and birds. Typical application of triclopyr on sites with Fender's blue butterfly would be spot spraying or direct basal application in the late summer or fall after senescence of Kincaid's lupine plants.

As a result, possible exposure of Fender's blue butterfly to triclopyr would be extremely limited. A study of the effects of completely covering eggs and larvae of a similar butterfly with a combination of glyphosate and triclopyr (far higher exposure than is possible here) found lower levels of egg hatching, but no reduction in pupation or adult survivorship (Sucoff et al. 2001). As with glyphosate, litter covering of Fender's blue butterfly larvae in the fall would minimize contact with triclopyr and reduce or avoid any potential associated adverse effects (USFWS 2011a, p. 18).

Proposed applications of clopyralid in the planning area would generally be spot spraying of thistle and knapweed infestations. There would be a moderate risk from chronic exposure of small birds to clopyralid from consuming contaminated vegetation. This conclusion of risk is predicated on the assumptions of boom spray applications, which would not typically occur in the planning area, and that a small bird would consume food (e.g., seeds from plants) throughout the day in a single location contaminated with clopyralid. Small bird species in the planning area are more likely to forage in several locations on a variety of foods. Such chronic exposure of small birds to clopyralid, although possible, is unlikely given the typical spot spray applications of clopyralid, the varied habitat conditions in the planning area, and the typical foraging behavior of small bird species in the planning area. Typical application of clopyralid on sites with Fender's blue butterfly would be spot spraying in late summer or fall after senescence of Kincaid's lupine plants. As with glyphosate and triclopyr, litter covering of Fender's blue butterfly larvae in the fall would minimize contact with clopyralid and reduce or avoid any potential associated adverse effects (USFWS 2011a, p. 18).

Aminopyralid has little to no acute and chronic toxicity to animals and its use poses minimal risk to animals (US Forest Service 2011, p. 46). There are no identified risks to animals from exposure to aminopyralid from proposed use in the planning area. As concluded in the risk assessment, there is no basis for asserting that adverse effects are plausible in mammals, fish, amphibians or aquatic invertebrates; any potential hazard to birds in all scenarios is below the level of concern; and there is no indication that adverse effects on terrestrial invertebrates are likely (SERA 2007, pp. 103-108). In addition to the low potential for hazard described in the risk assessment, the limited use of aminopyralid for Research and Demonstration in the planning area would result in little to no adverse effect on animals from use of aminopyralid. Typical application of aminopyralid on sites with Fender's blue butterfly would be spot spraying in late summer or fall after senescence of Kincaid's lupine. As with glyphosate, triclopyr, and clopyralid, litter covering of Fender's blue butterfly larvae in the fall would minimize contact with aminopyralid and reduce or avoid any potential associated adverse effects (USFWS 2011a, p. 18).

There is little information available on the effects of exposure to fluazifop on animals. The limited use of fluazifop for Research and Demonstration would limit or avoid any potential adverse effect on animals. Thurston County assessed the risks of fluazifop application and is incorporated here by reference. The Thurston County assessment concluded that fluazifop has low toxicity to mammals, birds, insects, and worms, but high toxicity to fish and moderate toxicity to crustaceans (Thurston County 2011). However, fluazifop breaks down to a metabolite that is practically non-toxic to fish and other aquatic organisms in less than a day after application (EPA 2005, p. 5; Thurston County 2011), making exposure of fish to

fluazifop unlikely. Given the rapid breakdown after application of fluazifop to a practically non-toxic metabolite, the only plausible adverse effect on fish would be from an accidental spill in water. As described above under Water, the likelihood of accidental spills in water would be extremely low, and the effect of any accidental spill would be highly localized. In addition, few of the streams in the planning area have native fish species.

There is some specific information, though not conclusive, on the effects of fluazifop on butterflies, from which inferences can be made about the effects of fluazifop on Fender's blue butterfly. Of the five herbicides proposed for use, fluazifop is the most likely to come into contact with Fender's blue butterfly, because it is the herbicide most likely to be used in the spring when adults may be in flight and larvae are above-ground and active, rather than during diapause when they are down in the litter layer (USFWS 2011a, p. 18). However, it is not clear whether contact with fluazifop would adversely affect Fender's blue butterfly. Greenhouse studies indicate that butterflies exposed to the fluazifop mixed with the non-ionic surfactant Preference experienced adverse effects (Russell and Schultz 2010). Subsequent studies reproduced that adverse effect using Preference alone, and found that fluazifop alone or fluazifop with alternative surfactants did not adversely affect butterflies (U.S. Fish and Wildlife Service 2011a, pp. 5, 18; U.S. Army Corps of Engineers 2011, pp. 12; Schultz et al. 2011, p. 373).

Any herbicide application would employ standard operating procedures, mitigation measures and conservation measures outlined in the BLM Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement and the associated Record of Decision (BLM 2007a, Volume 2, pp. 257-468; BLM 2007b, pp. 3-74), which have been adapted for the specific conditions in the planning area and are described in Appendix E). These measures are designed to minimize risk to resources, including animals. The application of these measures in the planning area would result in effects to animals consistent with the analyses in the BLM Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement and the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement, to which this analysis is tiered. Site-specific conditions in the planning area and the more limited proposed application of herbicides in the planning area, as detailed above, ensure that the effects on animals would not exceed the adverse effects described in those analyses.

Additional standard operating procedures and best management practices designed specifically to minimize adverse effects of herbicide use on Fender's blue butterfly are described in the following documents related to Willamette Valley prairie restoration and management of listed plant species, which are incorporated here by reference and described in Appendix E:

- Benton County Prairie Species Habitat Conservation Plan (Benton County 2010, Appendix J, pp. 1-11);
- U.S. Fish and Wildlife Service Programmatic Formal Consultation on Western Oregon Prairie Restoration Activities, Biological Opinion (USFWS 2008, pp. 8-12, 29-32);
- U.S. Fish and Wildlife Service Biological Opinion on U.S. Army Corps of Engineers Program of Management Activities for Rare Plants/Insects at Fern Ridge Lake Consultation (USFWS 2011a, pp. 3-6; 18-19; 22-24);

- U.S. Fish and Wildlife Service Willamette Valley National Refuge Complex, Draft Comprehensive Conservation Plan and Environmental Assessment (USFWS 2011b, pp. 6-6 – 6-11; Appendix F-1 – F-69);
- U.S. Fish and Wildlife Service Intra-Service Programmatic Biological Assessment for the Fish and Wildlife's Western Oregon Prairie Restoration Activities (USFWS 2008, pp. 8-12).

These documents describe the short-term adverse effects to Fender's blue butterfly, the measures to minimize these adverse effects, and the long-term benefits of herbicide use. Employing the measures in these documents would lessen or avoid potential short-term adverse effects to Fender's blue butterfly, which could include mortality from herbicide exposure, temporary reduction in larval plants or nectar plants from herbicide exposure, and incidental crushing of larvae or eggs from foot or vehicle traffic associated with herbicide application. The long-term positive effects of herbicide use would include the removal of non-native or native invasive species, restoring the distribution and abundance of native nectar species, and restoring the distribution and abundance of Kincaid's lupine, the butterfly's larval host. These long-term effects would improve overall habitat conditions for Fender's blue butterfly.

How would prescribed burning affect air quality?

Key Points
• Alternative 1 would have the greatest particulate emissions and Alternatives 2A and 2B would have the least particulate emissions of all alternatives. • Particulate emissions under any of the alternatives would constitute 1% or less of emissions from BLM-administered lands in western Oregon.

Prescribed burning for the purpose of habitat restoration and maintenance would be the only management action under the alternatives that would have a notable effect on air quality. This effect would be largely at the local level, because prescribed burning would be implemented in accordance with the Oregon Smoke Management Plan. The Oregon Smoke Management Plan minimizes smoke impacts from prescribed fires on local communities and directs smoke away from Smoke Sensitive Receptor Areas (see Chapter 3).

The analysis of future emissions is based on the acreage treated by plant community type and the typical quantities and size classes of fuels. The emissions shown in this analysis assume that all acres projected to receive treatment would in fact be treated. This may overestimate actual emissions; weather conditions and compliance with the Oregon Smoke Management Plan may prevent some treatments, as has been the case in the recent past (see Chapter 3). The emissions from prescribed burning are calculated based on annual averages for implementation under each alternative.

Emissions are calculated using First Order Fire Effects Model, version 5.9, a computer program for predicting tree mortality, fuel consumption, smoke production, and soil heating caused by prescribed fire or wildfire. Available online at http://www.firelab.org/science-applications/fire-fuel/111-fofem accessed May 2012. Emissions from prescribed burning were calculated separately for prairie and woodland plant communities because of the difference in fuel loading. The emissions for prescribed burning in oak woodland and oak savanna would vary considerably by site-specific fuel types and loading, which would depend on site type and recent management treatments. This analysis calculated emissions assuming that all prescribed burning would be the first burning on the site, which would have the highest fuel loading. Therefore, this analysis overestimates the emissions from future prescribed burning on previously burned sites, especially on woodland sites. It is not possible to quantify this overestimation precisely, but future prescribed burning on previously burned sites would likely be approximately 10 % lower per acre than estimated in this analysis.

Emissions from prescribed burning for habitat restoration and maintenance would vary by alternative, because both the total acreage treated and the acreage treated by plant community would vary by alternative. Table 27 displays the average annual emissions from prescribed burning for each alternative. This table displays emissions for particulate matter (PM_{10}), fine particular matter ($PM_{2.5}$),

carbon monoxide (C0), nitrogen oxides (NO_x), and sulfur dioxide (SO_2). Emissions of methane and carbon dioxide are described in the issue below on greenhouse gas emissions.

Table 27. Average annual emissions from prescribed burning by alternative

	acres burned		emissions (tons/year)				
	wet prairie and upland prairie	oak woodland and oak savanna	PM_{10}	$PM_{2.5}$	CO	NO_x	SO_2
No Action	165	24	6.4	5.5	59.8	1.5	0.7
Alt 1	185	75	17.6	14.9	181.6	2.0	1.2
Alt 2A	89	5	1.7	1.5	13.3	0.7	0.3
Alt 2B	89	5	1.7	1.5	13.3	0.7	0.3
Alt 3A	62	21	5.0	4.2	51.0	0.6	0.4
Alt 3B	63	21	5.0	4.3	51.0	0.7	0.4
Alt 3C	63	21	5.0	4.3	51.0	0.7	0.4

Alternative 1, which would burn both the most total acres and the most acres of oak woodland and oak savanna, would have the greatest emissions of all alternatives, more than three times the particulate emissions of any other action alternative. The No Action alternative would have the second highest level of emissions. Alternatives 2A and 2B would have the least emissions, even though these alternatives would burn more total acres than Alternatives 3A, 3B, and 3C. This is because Alternatives 2A and 2B would burn the fewest acres of oak woodland and oak savanna.

As stated above, the emissions for the No Action alternative and Alternative 1 would be overestimated if restrictions on prescribed burning, which vary from year-to-year with weather conditions and wildfire activity, continue at current levels. The amount of prescribed burning under the No Action alternative and Alternative 1 represents more than double the average acreage currently being burned. This increase may only be able to be accomplished under favorable weather conditions, reduced wildfire activity, or reduced air quality restrictions in the future. Alternatives 2A, 2B, 3A, 3B, and 3C represent approximately the average acreage currently being burned and presumably would be able to be accomplished in the future under typical conditions.

The Final Environmental Impact Statement for the Revision of Western Oregon RMPs described annual particulate emissions from prescribed burning on both BLM-administered lands in western Oregon and all ownerships. Current PM_{10} and $PM_{2.5}$ emissions from prescribed burning on BLM-administered lands in western Oregon total 1,854 tons per year and 1,155 tons per year, respectively. Current PM_{10} and $PM_{2.5}$ emissions from prescribed burning on all ownerships in western Oregon total 17,009 tons per year and 10,254 tons per year, respectively. That analysis is incorporated here by reference (BLM 2008, pp. 813-

816). The PM_{10} emissions from prescribed burning from the alternatives would all be less than 1% of the emissions from BLM-administered lands in western Oregon. The $PM_{2.5}$ emissions from prescribed burning from the alternatives would range from 0.1 to 1.3% of the emissions from BLM-administered lands in western Oregon.

Smoke from prescribed burning has potential indirect effects on human health. While there are many pollutants associated with smoke, the primary pollutant of concern from prescribed fire is particulate matter. The health effects of smoke vary from the irritation of the eyes and respiratory tract to more serious disorders, including asthma, bronchitis, reduced lung function and premature death. The potential health effects of emissions from prescribed burning are described in more detail in the Final Environmental Impact Statement for the Revision of Western Oregon RMPs (BLM 2008, pp. 813-816), which is incorporated here by reference.

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

There would be some potential effects on air quality from prescribed burning related to herbicide use under Alternatives 1, 2A, 2B, and 3A. The No Action alternative and Alternatives 3B and 3C would not include any herbicide use and therefore would have no air quality effects related to prescribed burning and herbicide use. The combined use of prescribed burning and herbicides under Alternatives 1, 2A, 2B, and 3A would raise the potential for transport of herbicide residues in smoke from the fire and subsequent human exposure. However, the potential for this transport of herbicide residues to the air would be extremely unlikely under the proposed herbicide applications in the planning area. While the use of herbicides prior to prescribed burning is not uncommon in commercial forestry operations, the typical application scenario for herbicide application proposed in the planning area would be for spot-spray or wiping of herbicides after prescribed burning, not before burning. As described above in the issue related to herbicide effects, the half-life of the proposed herbicides in soil is too short for herbicide residues to persist from one summer to the next. Finally, even for prescribed burns that follow broadcast herbicide application, which would not be a typical application proposed in the planning area, both theoretical studies and field studies have found that prescribed burning combusts herbicide residues to far below threshold exposure limits (Bush et al. 1998).

How would changing climate conditions alter the effect of BLM management actions on resources?

Key Points
• Listed plant species would not experience changes in abundance or range as a result of changing climate conditions under a moderate climate change scenario. • Fender's blue butterfly would be moderately vulnerable to changing climate conditions under a moderate climate change scenario. • Alternatives 1, 2A, and 2B would reduce the vulnerability of Fender's blue butterfly to climate change more than the other alternatives by creating greater connectivity of high quality habitat and greater populations of Kincaid's lupine.

This analysis examines the effects of changing climate conditions on several species of high interest within the planning area: Fender's blue butterfly, Bradshaw's lomatium, Willamette daisy, white-topped aster, Kincaid's lupine, and golden paintbrush.

Steel et al. evaluated species vulnerability to climate change in the Willamette Valley using the NatureServe Climate Change Vulnerability Index, which relies on spatial and life history data to model relative vulnerability of each species considered (Steel et al. undated; NatureServe undated). The Climate Change Vulnerability Index combines the exposure, sensitivity, and responses to climate change of each species to produce vulnerability scores by species. Vulnerability scores have five categories, ranging from "not vulnerable/increase likely" to "extremely vulnerable." Steel et al. assessed vulnerability using two climate scenarios: a baseline climate scenario based on moderate greenhouse gas emissions and a 16 climate-model ensemble, and a more extreme climate scenario characterized by greater warming and increases in precipitation. The results of this assessment are summarized below and the assessment is incorporated by reference (Steel et al. undated, pp. 12 – 31).

Kaye et al. also evaluated species vulnerability to climate change in the Willamette Valley using the NatureServe Climate Change Vulnerability Index (Kaye et al. 2012). Kaye et al. evaluated species vulnerability at three spatial scales (the West Eugene Wetlands, Willamette Valley, and species' range) under three emissions scenarios (low, middle-ground, and high). The results of this assessment are summarized below and the assessment is incorporated by reference (Kaye et al. 2012).

Under the baseline climate scenario, Fender's blue butterfly would be moderately vulnerable to climate change: the abundance and/or range of Fender's blue butterfly within the Willamette Valley would likely decrease by 2050. Under the baseline or moderate emissions climate change scenario: all of the plant species of interest would not be vulnerable and would be presumed stable: available evidence does not suggest that abundance and/or range of these species in the Willamette Valley would change by 2050 (Table 28).

Under the extreme climate scenario, Fender's blue butterfly would be extremely vulnerable to climate change: the abundance and/or range of Fender's blue butterfly within the Willamette Valley would be extremely likely to substantially decrease or disappear by 2050. Under the extreme climate scenario, Bradshaw's lomatium, Willamette daisy, and white-topped aster would be highly vulnerable to climate change: abundance and/or range of these species within the Willamette Valley would be likely to decrease significantly by 2050. Under the extreme climate scenario, Kincaid's lupine and golden paintbrush would be moderately vulnerable to climate change: abundance and/or range of these species within the Willamette Valley would be likely to decrease by 2050.

Table 28. Species vulnerability to climate change (Steel et al. undated)

species	Baseline climate scenario	Extreme climate scenario
Fender's blue butterfly	Moderately vulnerable	Extremely vulnerable
Bradshaw's lomatium	Not vulnerable	Highly vulnerable
Willamette daisy	Not vulnerable	Highly vulnerable
white-topped aster	Not vulnerable	Highly vulnerable
Kincaid's lupine	Not vulnerable	Moderately vulnerable
golden paintbrush	Not vulnerable	Moderately vulnerable

The confidence in the predictions Steel et al. of the baseline climate scenario ranges in from moderate to high for the assessment of the species of interest in this analysis. The confidence in the extreme climate scenario is lower than the baseline climate scenario, and the extreme climate scenario cannot be considered reasonably foreseeable, in that it is not highly probable based on known trends.

The species vulnerability results in Kaye et al. (2012) are similar to the results in Steel et al. Under the low emissions scenario, all assessed species would not be vulnerable and would be presumed stable at all three spatial scales. Under the middle-ground emissions scenario, Fender's blue butterfly would be moderately vulnerable to climate change at the scale of the West Eugene Wetlands or the Willamette Valley, but not vulnerable at the scale of the species' range. Under the middle-ground emissions scenario, all of the plant species would not be vulnerable at the scale of the West Eugene Wetlands. At the scale of the Willamette Valley and the species' ranges, Bradshaw's lomatium and Kincaid's lupine would not be vulnerable, but Willamette daisy, white-topped aster, and golden paintbrush would be moderately vulnerable. Under the high emissions scenario, most species would be moderately or highly vulnerable at each spatial scale, but Willamette daisy would be extremely vulnerable at the scale of the Willamette Valley and the species' range (Kaye et al. 2012, pp. 10-11). As noted above, the high emissions scenario cannot be considered reasonably foreseeable, in that it is not highly probable based on known trends.

The assessments by Steel et al. and Kaye et al. demonstrate that it is not reasonably foreseeable that changing climate conditions will alter the effects of BLM land management on these plant species of interest under any of the alternatives. However, changing climate conditions may interact with the effects of BLM land management on Fender's blue butterfly. If the abundance or range of Fender's blue butterfly decreases in response to climate change, the effectiveness of habitat restoration efforts under each alternative could be altered (USFWS 2011b, pp. 6-46 – 6-48).

Steel et al. identify the importance of maintaining landscape connectivity of habitat for these species to reduce the risk of adverse effects on these species from climate change. Specifically for Fender's blue butterfly, Steel et al. recommend augmenting Kincaid's lupine populations and nectar source populations and creating a fine-scale connectivity of habitat (Steel et al. undated, pp. 36-39). Alternatives that would result in greater connectivity of high quality habitat and greater populations of Kincaid's lupine would better reduce the vulnerability of Fender's blue butterfly to climate change. As detailed in the issues above addressing threatened and endangered species, Alternative 1 would create the most acres of high quality habitat for Fender's blue butterfly, and Alternatives 1, 2A, and 3B would create a connected network of habitat. Alternative 1 would create the largest, long-term population of Kincaid's lupine of all alternatives. Alternatives 1, 2A, and 2B would meet recovery targets for Fender's blue butterfly for distribution and abundance and habitat quality and management. These alternatives would therefore reduce the vulnerability of Fender's blue butterfly to climate change more than the other alternatives.

How would BLM management actions affect greenhouse gas emissions and carbon storage?

Key Points
• Greenhouse gas emissions would vary among the alternatives as a result of the amount of prescribed burning and the conversion of forested plant communities to prairie and savanna plant communities, ranging from 1,000 to 2,000 tonnes per year.

Land management activities, including habitat restoration and maintenance, can result in changes in ecosystem carbon storage. In addition, land management activities such as prescribed burning directly result in greenhouse gas emissions. The extent and location of land management activities would vary among the alternatives, and therefore the greenhouse gas emissions and changes in ecosystem carbon storage would vary among the alternatives.

This analysis is based on the best available information and is consistent with current theoretical approaches. However, incomplete and unavailable information requires the use of broad generalizations and assumptions, which lead to substantial uncertainty in the estimations of carbon storage, as detailed in Chapter 3. Therefore, these results must be interpreted with caution, because the difference among the alternatives over time would be less than the uncertainty associated with these estimations.

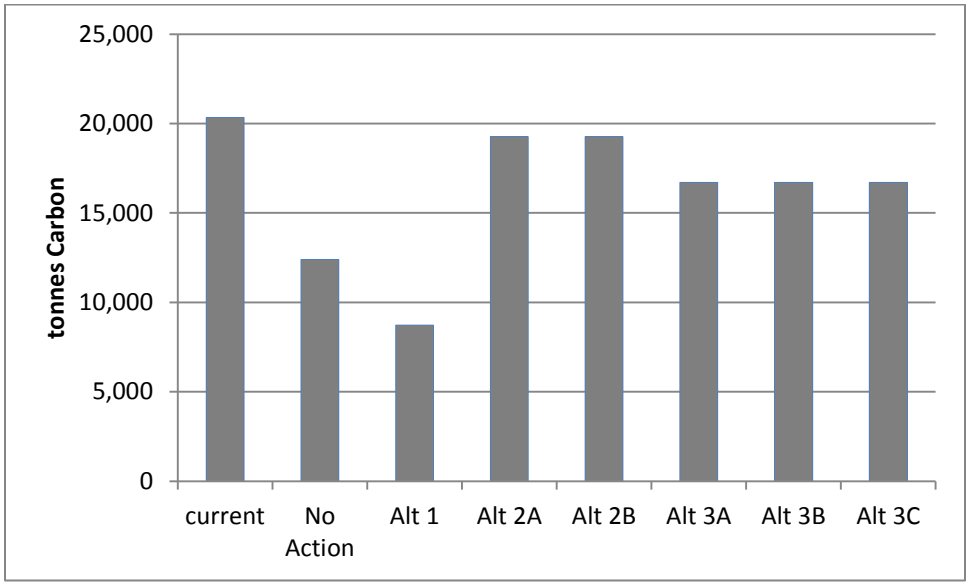
This analysis assumes that measurable changes in carbon storage would occur only as a result of changes in plant communities, such as converting ash swale/riparian to wet prairie through restoration actions. Changes in the condition of plant communities, such as changing low quality wet prairie to high quality wet prairie would not result in measurable changes in carbon storage at the scale of this analysis. All of the alternatives, including the No Action alternative, would apply land management actions designed to restore prairie and savanna habitat. All of the alternatives would reduce the extent of ash swale/riparian and oak woodland communities and increase wet prairie, upland prairie and oak savanna communities. As a result, all alternatives would reduce carbon storage in the planning area in ten years. Alternatives 2A and 2B would result in the most carbon storage of any alternatives: 19,000 tonnes, which is a 5% reduction from the current amount (see Figure 27). Alternative 1 would result in the least carbon storage: 9,000 tonnes, which is a 57% reduction from the current amount. This change in carbon storage over a span of ten years represents carbon losses equivalent to

- 4,000 tonnes of carbon dioxide for Alternatives 2 and 2B;
- 13,000 tonnes of carbon dioxide for Alternatives 3A, 3B, and 3C;
- 29,000 tonnes of carbon dioxide for the No Action alternative; and
- 43,000 tonnes of carbon dioxide for Alternative 1.

Once habitat restoration efforts have restored the target habitat condition, management under all alternatives would be designed to maintain that habitat condition. Future habitat maintenance would

not result in any measurable changes in carbon storage at the scale of this analysis. Therefore, future changes in carbon storage under all alternatives would decline after ten years.

Figure 27. Carbon storage in ten years by alternative



Prescribed burning under the alternatives would result in emissions of carbon dioxide, methane, and nitrogen oxides. The carbon dioxide equivalent of emissions of these three greenhouse gases would be 2,000 tonnes per year of carbon dioxide equivalent for Alternative 1, and 1,000 tonnes per year for all other alternatives, including the No Action alternative. The annual greenhouse gas emissions from the alternatives, as calculated from the direct emissions from prescribed burning, would be equivalent to the greenhouse gas emissions from the production of approximately 2,000 to 4,000 megawatt hours of electricity. Other than Alternative 1, the difference among the alternatives is too small to measure at the precision of this analysis. The greenhouse gas emissions from machinery use under all alternatives would be substantially less than 10 tonnes per year, and is therefore too small to measure in this analysis, which rounds emissions to the nearest 1,000 tonnes.

The change in carbon storage as a result of habitat restoration changing plant communities and the emissions from prescribed burning provide a redundant estimation of greenhouse gas emissions. Prescribed burning is one of the management tools that would be used for habitat restoration that would cause the change in plant communities. Although these two estimations provide redundant measures, the emissions from prescribed burning do not fully account for the changes in carbon storage resulting from habitat restoration. Other habitat management tools, such as mowing and herbicide, would have indirect and complex effects on ecosystem carbon storage. Additionally, the estimations on average carbon storage by plant community described in Chapter 3 and the estimates on fuel loads in areas that would be burned are broad generalizations in the absence of inventory data. Nevertheless,

these two different analytical methods for estimating greenhouse gas emissions yield quantitative results of similar magnitude, and similar relative outcomes for the alternatives (see Table 29).

Table 29. Comparing carbon emissions by alternative over 10 years by two different analytical methods

	carbon dioxide equivalents, tonnes						
	No Action	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 3C
Calculated from changes in carbon storage	29,000	43,000	4,000	4,000	13,000	13,000	13,000
Calculated from direct emissions from prescribed burning	14,000	24,000	6,000	6,000	7,000	7,000	7,000

As noted in Chapter 3, changes in ecosystem carbon storage can affect atmospheric concentrations of carbon dioxide, and thereby affect global climate. The effects of changes in carbon storage on atmospheric carbon dioxide concentration are manifested globally. Therefore, the changes in carbon storage in the planning area must be placed in the context of global carbon storage and atmospheric carbon dioxide levels. Globally, terrestrial ecosystems currently store 2.3 trillion tonnes of carbon in the vegetation, soil, and detritus (Denman et al. 2007, p. 515). The carbon stored in the planning area constitutes less than 0.0000001% of global carbon stored in terrestrial ecosystems.

Atmospheric carbon in the form of carbon dioxide is increasing at a rate of 3.2 to 4.1 billion tonnes of carbon per year (Denman et al. 2007, p. 512). The emissions from the alternatives range from 0.00002 to 0.00006% of the global increase in atmospheric carbon dioxide. The differences among the alternatives in greenhouse gas emissions are so infinitesimally small that, when compared to other sources of greenhouse gas emissions or when compared to carbon storage at a broader scale, the differences among the alternatives are not possible to interpret meaningfully.

How would BLM management actions affect archaeological, historical and traditional use resources (trust responsibilities)?

Key Points
• Nearly all effects to archaeological and historic sites would be reduced or eliminated by conducting pre-disturbance inventories to identify sites and avoiding or protecting identified sites. • Habitat restoration would generally benefit traditional use plants, but the use of herbicides could adversely affect traditional use plant gathering. • Herbicide use would not be allowed under Alternatives 2A, 2B, and 3A on the Stewart Pond and Eastern Gateway sites, which the Confederated Tribes of Grand Ronde identified as potential sites for traditional use plant gathering.

Archaeological and Historic Resources

Cultural resources are nonrenewable, and damage or displacement from their natural context is most often irreparable. Effects to archaeological and historic resources occur when site materials are disturbed or removed from their original context, or their integrity is disrupted or destroyed. Historical structures can be adversely affected by changes to the structure itself or changes to elements of the surrounding environment that are considered part of the criteria making the site or structure significant. Actions that most often cause effects to archaeological and historic resources include any activity that displaces the mineral soil, burning, erosion, and looting.

Under all alternatives, nearly all effects to archaeological and historic sites would be reduced or eliminated by conducting pre-disturbance inventories to identify sites across the landscape. Section 106 of the National Historic Preservation Act requires that proposed actions or undertakings be reviewed for their potential to affect historic properties (e.g., historic sites, archaeological sites found to be eligible for listing in or listed in the National Register of Historic Places). This includes properties associated with traditional cultural and/or religious values. Where effects are found to be adverse, the Section 106 process stipulates that measures to avoid, lessen or mitigate these effects be enacted through consultation with the State Historic Preservation Officer and other parties to the Section 106 process. This process would be followed under all alternatives. At times, avoidance or protection would not be possible, and mitigation measures would be implemented in order to preserve a portion of the site or recover the data value inherent within the site. These kinds of scenarios would result in incidental loss of sites or site values. Examples would include:

- Archaeological sites that could not be entirely avoided by project redesign without eliminating the benefits of the project.
- Projects that could not be redesigned or relocated due to topographical features that dictate where a road or other engineering feature must be located.
- Sites where the important value lies within the visual setting of the resources (e.g., a historic homestead, or spiritual locations or sacred sites).

- Sites that were not identified during pre-disturbance inventories due to heavy ground cover such as grass or because the site is deeply buried and not identified until exposed.
- Natural processes such as erosion or inundation due to water course changes.

The No Action alternative and Alternative 1 would have the most ground disturbance of all alternatives. Approximately 30 acres of thinning per year in forested plant communities would occur under each alternative (Table 2). Timber removal would cause the most soil disturbance of all the proposed habitat treatment actions, and therefore would have the highest likelihood of affecting buried archaeological sites. Woodland thinning in the other two alternatives would be of a minimal extent and would not be likely cause substantial soil disturbance.

Mowing would occur under all alternatives, but the acres of mowing would vary among the alternatives. Nevertheless, the likelihood of impacts to cultural resources from mowing would be minimal, because mowing typically would not disturb the soil. Therefore, mowing would be unlikely to affect cultural sites. Mowing has the potential to affect traditional use plants, however most plants of interest would be little affected by mowing. Shrub and forested areas in which hazel and willow occur would not be mowed. Mowing would typically be done after senescence of camas and therefore have no direct effects; mowing would control some competing vegetation, especially woody plants, such as blackberries and ash seedlings.

Prescribed burning for habitat restoration and maintenance would occur under all alternatives, but the acres of prescribed burning would vary among the alternatives. Nevertheless, the likelihood of impacts to cultural resources would be minimal, because the proposed burning would be unlikely to affect archaeological sites. The proposed prescribed burning would typically be fast-moving fires that would not burn very hot for long periods of time in one place. Most archaeological sites on the surface or buried beneath the soil would not be affected by this type of burning. The most common components of archaeological sites in this general geographic area are stone tools and their fragments or debitage (flakes or chips of stone created in stone tool-making), which would not be affected by low levels of heat. Ensuring that the fire lines are created by mowing rather than trench digging would also help avoid effects to archaeological sites. Prescribed burning would have the potential to affect historic sites and structures, specifically those that exist above ground and are made of perishable materials such as wood. Most historic sites of this kind would be readily identifiable by pre-disturbance inventories, and these sites would be avoided prior to implementation of prescribed burning.

Herbicides application would occur under Alternatives 1, 2A, 2B, and 3A. Generally, herbicide use would not directly affect archaeological or historic resources, but there would be some potential indirect effects. The Final EIS for Vegetation Treatments Using Herbicides on BLM Lands in Oregon describes the potential indirect effects of herbicide use on archaeological and historic resources, such as contributing to artifact deterioration (BLM 2010a, pp. 285-287), and that analysis is incorporated here by reference.

Traditional Use Resources

Adverse effects to traditional use sites can be caused by the alteration of sites or site settings, or loss of access to sites. Adverse impacts to traditional use resources include the reduction or elimination of resources such as plant materials that are gathered for traditional crafts, or plants gathered for food or medicine. Actions that reduce competitive vegetation can provide beneficial impacts to traditional use resources by promoting growth of the desired plant species.

Consultation with local tribes has yet to yield the identification of specific traditional use sites. The Confederated Tribes of Grand Ronde has identified to BLM a variety of traditional use plants that the tribe is interested in gathering. This early identification of plants of interest can reduce or eliminate any adverse impacts to these resources.

Under all action alternatives, some level of traditional use plant gathering and management would be allowed. The extent of habitat restoration and maintenance activities would vary among alternatives, but all alternatives would promote the reduction of invasive species and the production of native species, some of which are of interest for traditional uses. The practice of prescribed burning, which is proposed in all alternatives, would be generally beneficial to traditional use resources, as it would reduce unwanted vegetation and promote healthy growth of many desirable traditional use plants. The abundance of some plants of interest for traditional use, particularly camas and tarweed, would increase with the abundance of high quality prairie habitats. Camas is nectar species for Fender's blue butterfly and is therefore a component of the prairie diversity targets that define high quality prairie habitats (see Table 4). Alternative 1 would create the most high quality prairie habitats and therefore would increase camas abundance the most, followed by Alternatives 2A and 2B, and Alternative 3A.

Herbicide use under Alternatives 1, 2A, 2B, and 3A would potentially adversely affect traditional use plant gathering. The Final EIS for Vegetation Treatments Using Herbicides on BLM Lands in Oregon describes the potential effects of herbicide use on traditional use plants, noting that herbicides can harm plants used by tribal members and can affect the health of the people who gather, process, or ingest plants treated by herbicides (BLM 2010a, p. 286). The effect of herbicide use on non-target vegetation is analyzed above under the issue related to the effects of herbicide use. The potential effect of herbicide use on human health is addressed in Chapter 1. In addition to the effects on traditional use plants and potential effect on human health, the application of herbicides may cause some people to avoid use of treated areas and to avoid plant gathering in areas that have a history of treatment. Scoping comments for this EIS suggested that some people who gather plants for traditional uses would avoid sites that have had any herbicide application.

Adverse effects of herbicide application on traditional use plant gathering could be reduced or eliminated by avoiding the use of herbicides in areas identified for traditional use plant gathering; and avoiding plant gathering in areas recently treated with herbicides. Avoiding the use of herbicides would preclude the restoration of high quality prairie plant communities, as described in the issue above related to plant communities, and limit the ability to manage sites for some traditional use plants, such as camas and tarweed.

There would be no effect of herbicide application on traditional use plant gathering under the No Action alternative, or Alternatives 3B and 3C, because there would be no herbicide applications under these alternatives. Adverse effects to traditional use plant gathering from herbicide application would be highest under Alternative 1, which proposes herbicide use on the largest acreage of any alternative. There would be no sites under Alternative 1 where herbicide use would be prohibited. Herbicide application would be lower under Alternatives 2A, 2B, and 3A than Alternative 1. In addition, Alternatives 2A, 2B, and 3A would prohibit herbicide use on the Stewart Pond and Eastern Gateway sites, which the Confederated Tribes of Grand Ronde tribe identified as potential sites for traditional use plant gathering.

How would BLM management actions affect access to the planning area, authorizations over the planning area, and authorizations for extractive uses in the planning area?

Key Points
• Access to a majority of the planning area is already provided by existing public roads. • There would be no reasonably foreseeable effects of future rights-of-way, because of the existing trend of very few right-of-way applications and the extensive right-of-way exclusion areas under the action alternatives. • There would be no reasonably foreseeable effects of locatable or leaseable mineral development under any action alternatives. • Under all action alternatives except Alternative 2B, there would be no effects of future saleable mineral development because the planning area would be closed to saleable mineral development. Under Alternative 2B and the No Action alternative, there are no reasonably foreseeable effects of future saleable mineral development, because there has been no history of saleable mineral development or expressions of interest in development within the planning area.

Lands and Realty

Access to a majority of the planning area is already provided by existing public roads. Opportunities for additional access by non-BLM parties to BLM-administered parcels would differ only slightly with the management objectives and management direction in the action alternatives regarding rights-of-way.

Under the No Action alternative, there are no existing decisions for lands and realty direction in the planning area. Under the No Action alternative, sites have not been allocated to Land Tenure Zones, which would provide direction for retention, exchange, or disposal. There are no identified right-of-way exclusion areas. Therefore, the entire planning area would be open for applications for new rights-of-way.

Right-of-way exclusion areas would differ among the action alternatives, which would result in differing amounts of restrictions on potential future access to the planning area. Under Alternative 1, almost all of the planning area (approximately 85%) would be a right-of-way exclusion area because of the extent of the Prairie Restoration Area. Under Alternatives 2A and 2B, the Prairie Restoration Area and Long Tom ACEC would be right-of-way exclusion zones. Under Alternatives 3A, 3B, and 3C, the Prairie Restoration Area and designated Critical Habitat would be right-of-way exclusion areas. Because the location of the Prairie Restoration Area would differ among the groups of alternatives, the location of the right-of-way exclusions areas would differ slightly; however the total extent of the right-of-way exclusion areas would be approximately one-third of the planning area under Alternatives 2A, 2B, 3A, 3B, and 3C.

Outside of the exclusion areas identified in the action alternatives, decisions regarding any future rights-of-way applications would be implementation-level decisions, and would depend on site-specific NEPA analysis. There has been minimal interest by non-BLM parties in acquiring new authorizations in the planning area. This is due, in part, to the fact that the acquired lands in the planning area were acquired "subject to" most of the needed infrastructure already in place (such as roads and utilities). Given the very low level and sporadic nature of past right-of-way applications in the planning area, it is reasonably foreseeable that there will be few if any future right-of-way applications in the future in the planning area outside of exclusion areas identified in the action alternatives. Therefore, it is not possible to predict any particular future right-of-way application, and effects of the authorization of any new rights-of-way on various resources and resource uses would be entirely speculative and are not addressed further in this analysis.

The action alternatives would all have the same effect on disposal and acquisition, because the action alternatives would not differ in the allocation of sites to Land Tenure Zones or in other direction regarding disposal and acquisition.

The only site in the planning area identified as suitable for disposal is the Danebo site, which is allocated to Land Tenure Zone 3 in all action alternatives. The disposal of the Danebo site is directed by Public Law 109-457 (120 Stat. 3392), whereby ownership of this parcel would transfer to the City of Eugene if certain conditions are met. Transfer of the Danebo site to the City of Eugene under the terms of Public Law 109-457 would not result in uses of the Danebo site inconsistent with the current uses and would not alter access in the planning area for the public or for the BLM.

Under all action alternatives, any survey hiatuses identified in the future and any unintentional occupancy trespassed lands (including any unintentional realty-related use, occupancy, or developed lands) would be allocated to Land Tenure Zone 3 as suitable for disposal. The occurrence of any such site is entirely speculative. If such sites exist or occur, such sites may be found to have special values, because of which the BLM may choose not to pursue disposal. Therefore, even if such sites exist or occur, disposal of any particular site is also entirely speculative and is not addressed further in this analysis. Any specific disposal action of such sites would depend on site-specific NEPA analysis.

As directed by the State Director guidance presented in the Proposed Planning Criteria and State Director Guidance, further planned land acquisition by the BLM in the planning area is beyond the scope of the RMP. Therefore, acquisition criteria are not included in any of the alternatives. Any future unplanned acquisitions, such as from donations, would be entirely speculative. Therefore, it is impossible to analyze any effect of unplanned acquisitions on access in the planning area.

Minerals and Energy

Almost all of the planning area is closed to locatable minerals, as described in Chapter 3. Therefore, there would be no potential for effects from locatable mineral exploration or development on other resources on these closed parcels. There are two survey hiatuses that are open to locatable mineral exploration and development and would remain open under all alternatives. However, both of these

parcels are considered to have low potential for locatable minerals (as are all parcels in the planning area). Therefore, any effect of locatable mineral exploration and development on other resources on these two parcels under any of the alternatives would be speculative and remote.

Under all action alternatives, the planning area would continue to be open for leasing, exploration, and development of leasable minerals. Under all action alternatives, a no surface occupancy stipulation would be required for leasing throughout the planning area to protect other resource values. Within the planning area, the potential for mineral leasing of oil and gas is moderate and for all other leasable minerals is low. Under all action alternatives, there would be no effect of leasable mineral exploration and development on other resources because of the prohibition on surface occupancy. Under the No Action alternative, there are no decisions governing the leasing, exploration, or development of leasable minerals. Under the No Action alternative, any future leasing decisions may or may not include a no surface occupancy stipulation, and therefore leasable mineral development could potentially affect other resources, such as plant and animal habitat and recreation. However, such effects are speculative and remote, given the moderate to low potential for leasable minerals in the planning area; the lack of any demonstrated demand; and the uncertainty of any future leasing decisions.

Under the No Action alternative, there are no decisions governing the development or disposal of saleable minerals. No sites within the planning area would be closed to saleable mineral development or disposal. Any decisions on saleable mineral development or disposal would be made on a case-by-case basis in response to specific requests. Under Alternative 2B, the Prairie Restoration Area and Long Tom Area of Environmental Concern would be closed to saleable mineral development and disposal, but the Natural Maintenance Area would be open to saleable mineral development and disposal. Within these open areas, saleable minerals would generally be available relative to the anticipated demand, and decisions on saleable mineral development or disposal would be made on a case-by-case basis. Under all other action alternatives, all of the planning area would be closed to saleable mineral development or disposal. Therefore, there would be no potential for effects from saleable mineral development or disposal on other resources under these action alternatives.

Neither site-specific nor quantitative analyses of cumulative effects of mineral or energy exploration or development are possible due to the uncertainty of whether and where mining operations would be authorized within lands open to that use. The effects of restrictions under any of the action alternatives on mineral or energy exploration or development would be minor. First, most mineral development is already prohibited on most lands in the planning area, so the net loss of available land for exploration and development would be small. Secondly, the potential for mineral development within the planning area is low to moderate, and there has been no past interest in mineral exploration in the planning area. Finally, the planning area represents such a tiny portion of the overall land base in the area that the BLM would constitute a minor supplier of any of these resources even in the absence of land use plan restrictions.

How would BLM management actions affect recreation opportunities?

Key Points
• The quantity of recreation opportunities would remain unchanged for all sites under all alternatives, except for Stewart Pond under Alternative 3C, which would have substantially increased recreation opportunities.

The analysis of the effects of the alternatives on recreation opportunities uses the following recreation indicators:

- "Recreation experience quality" is indicated by a recreationist's level of satisfaction with their recreation experience. Setting conditions, frequency of encounters with other recreationists and other visitors, and degree of similarity or conflict with other recreationists and other visitors encountered are factors that affect satisfaction.
- "Quantity of recreation opportunities" is indicated by the number of sites, length of trail, and visitor capacity at sites. Different recreation opportunities are described by the range of settings, levels of site improvement or development, or facilities available.
- "Visitor displacement" occurs when setting conditions or changes cause visitors who might otherwise recreate in the setting to either leave temporarily of stop using it altogether. Setting changes include the presence and activities of other recreationists and other visitors, level of land management intervention or site modification, and effects on the setting from non-recreation uses. Displaced visitors indicate either short or long-term loss of recreation opportunities.

Under all alternatives the settings for the sites in the planning area would remain in their current condition. The management objectives and management direction would not alter the remoteness, naturalness, physical appearance, evidence of use, access, or contacts of any site so substantially as to alter the setting. Most of the planning area already has a rural or urban setting, and thus the site setting is highly modified. The predominant land management activity under all of the alternatives would be habitat restoration and maintenance, which would add little modification to the already highly modified character of the planning area. Habitat restoration and maintenance would have the effect of maintaining or increasing the naturalness of the sites and improving the physical appearance. The fragmented land ownership pattern with small BLM-administered parcels, combined with the highly developed character of the surrounding area, limits the ability of BLM management to have a substantial effect on the remoteness, naturalness, or physical appearance of the planning area.

The recreation experience quality for recreationists would remain unchanged under all alternatives for all sites in the planning area except Stewart Pond under Alternative 3C. None of the alternatives would alter the setting, frequency of encounters, or type of recreationists at any of the sites except Stewart Pond, and thus would not alter the recreation experience quality at these sites. At Stewart Pond, the recreation experience quality would remain unchanged under all alternatives except Alternative 3C. The

Stewart Pond site under Alternative 3C would continue to have an urban setting, but the frequency of encounters with other recreationists would increase because of the additional trails, facilities, and the development of the disc golf course. The more structured recreation use of the disc golf course would create a modest contrast with the other predominant recreation uses on the site: hiking and wildlife viewing. While these uses would contrast, they would not conflict. The increased recreation use of the site and increased management of the site would decrease the current unauthorized uses of the site, such as camping, as described below.

The quantity of recreation opportunities would remain unchanged under all alternatives for all sites in the planning area except Stewart Pond under Alternative 3C. All alternatives except Alternative 3C would maintain the existing recreation opportunities but would not seek to increase recreation opportunities. At Stewart Pond, the quantity of recreation opportunities would remain unchanged under all alternatives except Alternative 3C. The Stewart Pond site under Alternative 3C would have increased length of trails, improved parking and bathroom facilities, and the development of a disc golf course, substantially increasing the recreation opportunities at this site. The development of a disc golf course would introduce a recreation use of a type not currently provided in the planning area and in short supply in the area (M. Benotsch, Eugene Disc Golf Club, *personal communication*, March 2, 2012). Under Alternative 3C, trail improvement and construction may occur on other sites, increasing the quantity of recreation opportunities, depending on recreational demand and feasibility. Identifying specific trail improvement or construction under Alternative 3C other than at Stewart Pond would be speculative. Nevertheless, based on past trends in the planning area, new trail construction at one or two parcels over the next ten years would be reasonably foreseeable at parcels other than Stewart Pond under Alternative 3C.

Visitor displacement is currently occurring at the Stewart Pond and Eastern Gateway sites. Unauthorized uses, such as camping, limit the use of these sites by recreationists, such as hikers and bird watchers. Litter and vandalism at these sites degrade the physical appearance of these sites and increase the evidence of use. Under all alternatives except Alternative 3C, visitor displacement would continue at these sites as it is currently occurring. Under Alternative 3C, increased recreation opportunities, improved facilities, and increased presence of recreationists would reduce the unauthorized uses, decreasing recreation visitor displacement. The increase visibility of the site as a result of vegetation management and the frequent presence of recreationists would make the site less hospitable for unauthorized uses, such as unauthorized camping. The development and use of active recreation opportunities, such as disc golf courses, has successfully reduced unauthorized uses in other urban natural areas in Oregon (Matt Benotsch, Eugene Disc Golf Club, *personal communication*, August 14, 2012).

How much would it cost to implement the alternatives?

Key Points
• Alternative 1 would have the highest annual cost to implement, because it would have the highest habitat management costs. • The No Action alternative would have the second-highest annual costs. • Alternative 3C would have low total annual costs, but would have the highest annual costs for recreation maintenance and would have substantial one-time costs for recreation development.

Of the costs associated with BLM management of the planning area, habitat management and recreation developments are the only costs that are likely to vary substantially by alternative. It is possible that differences among the alternatives in habitat management and recreation developments would lead to different costs for resource inventories, resource monitoring, staff, and overhead, but such changes would be speculative. This analysis assumes that the current spending on all aspects of BLM administration of the planning area other than habitat maintenance and recreation developments would continue at current levels. These costs, which are assumed to remain constant under all alternatives, total approximately $330,000 per year.

The cost for habitat management would vary substantially among the alternatives, because the alternatives would differ in the extent of habitat management activities and in the habitat management tools available. The cost per acre of different habitat management treatments differ substantially. This analysis assumes treatment costs per acre as follows:

- mechanical: $225
- non-restoration mowing: $56
- manual: $345
- prescribed burning: $340
- herbicide application: $107 (BLM 2010a, p. 340).

Mechanical treatments include mowing and mastication. Non-restoration mowing is mowing the perimeter of a site to comply with Eugene city code regarding vegetation control. These per-acre cost estimates for mechanical, non-restoration mowing, manual, and prescribed burning are approximately consistent with the costs of current BLM application of these management treatments and would not vary by alternative.

This analysis assumes that the cost for plant augmentation would be $700 per acre. The actual costs for plant augmentation would vary widely, depending on the planting method, the specific plant species used, the scale of planting, and the machinery used. Costs per acres for augmentation could reasonably be expected to range from $75 per acre for mechanical seeding on large areas to as high as $6,000 per acre for hand-planting of plugs for small areas with dense plantings (T. Kaye, Institute for Applied Ecology, *personal communication*, May 8, 2012). It is not possible to forecast the specific planting methods, scale, and machinery that would be used to conduct plant augmentation under the

alternatives. This analysis uses a consistent estimate of $700/acre for plant augmentation, which would overestimate the cost of some seeding and underestimate the cost of some planting of plugs. However, the alternatives would not qualitatively differ in their approaches to plant augmentation. Therefore, this use of a consistent cost for plant augmentation provides a basis for a relative comparison of the costs of implementing each alternative. Plant augmentation would not be an annual cost: if successful, there would be no need for additional augmentation on a specific site. There may be some replanting or reseeding of sites if initial augmentation were unsuccessful, but this additional augmentation would be speculative and is not included in the estimation of costs. Plant augmentation would likely be implemented over time in the planning area, because augmentation would ideally take place on sites after implementation of habitat restoration actions. For the purpose of this analysis, plant augmentation under each alternative is assumed to occur at an even pace over a 10-year period. Costs for plant augmentation would not likely continue beyond 10 years, or at least not at the same level. However, this future decrease in costs beyond the first decade of implementation is not included in this analysis of costs.

The No Action alternative represents continued implementation of the current management approach. This analysis concludes that habitat management actions of mowing, manual treatments, and prescribed burning under the No Action alternative would cost approximately $127,000 per year. This estimate is consistent with the recent funding for these habitat management actions, which has ranged from $113,000 to $187,000. This indicates that the cost estimates for these actions used in this analysis are reasonably accurate, based on recent experience. Plant augmentation, for which there is an existing decision, is part of the current management approach but has not yet been implemented. Therefore, the cost of plant augmentation is not reflected in the recent funding for habitat management in the planning area. Under the No Action alternative, plant augmentation would cost $67,000 per year. The No Action alternative would conduct the most acres of plant augmentation of any alternative. Altogether, habitat management actions of mowing, manual treatments, prescribed burning, and plant augmentation under the No Action alternative would cost $198,000 per year. The average acreage of management treatments by alternative are displayed in Table 2 in Chapter 2.

Habitat management costs for Alternative 1 would be $272,000 per year, the highest of any alternative. Alternative 1 would conduct the most acres of burning and herbicide application of any alternative, and the second-most acres of plant augmentation.

Habitat management costs for Alternatives 2A and 2B would be $126,000 per year, which would be below recent costs for habitat management that did not include plant augmentation. Alternatives 2A and 2B would have the smallest acreage of mowing and the smallest acreage of manual treatments of any alternative. The use of herbicides and the concomitant decrease in the acres of other treatments compared to the No Action alternative would reduce the costs for habitat management.

Habitat management costs for Alternative 3A would be $111,000 per year, which would be the lowest of any alternative. Alternative 3A would have the smallest acreage of prescribed burning and the smallest

acreage of plant augmentation of any alternative. Of the alternatives that would apply herbicides, Alternative 3A would have the smallest acreage of herbicide application.

Habitat management costs for Alternatives 3B and 3C would be $111,000 per year, approximately the same as Alternative 3A. The acreage of manual treatments and prescribed burning would be similar to Alternative 3A, but Alternatives 3B and 3C would have the highest acreage of mowing of any alternatives and would apply no herbicides.

Recreation costs for maintenance would continue under all alternatives. Based on past experience in the planning area, this analysis assumes a continuing cost of $4,000 per year of recreation trail maintenance. New recreation developments would be implemented only under Alternative 3C. This analysis assumes recreation costs as follows:

- new trail construction: $5,000
- construction of concrete vault restroom: $30,000
- annual cost of maintenance of concrete vault restroom: $5,000 per year
- construction of paved parking lot: $30,000
- construction of kiosks, picnic tables, benches, signs: $10,000

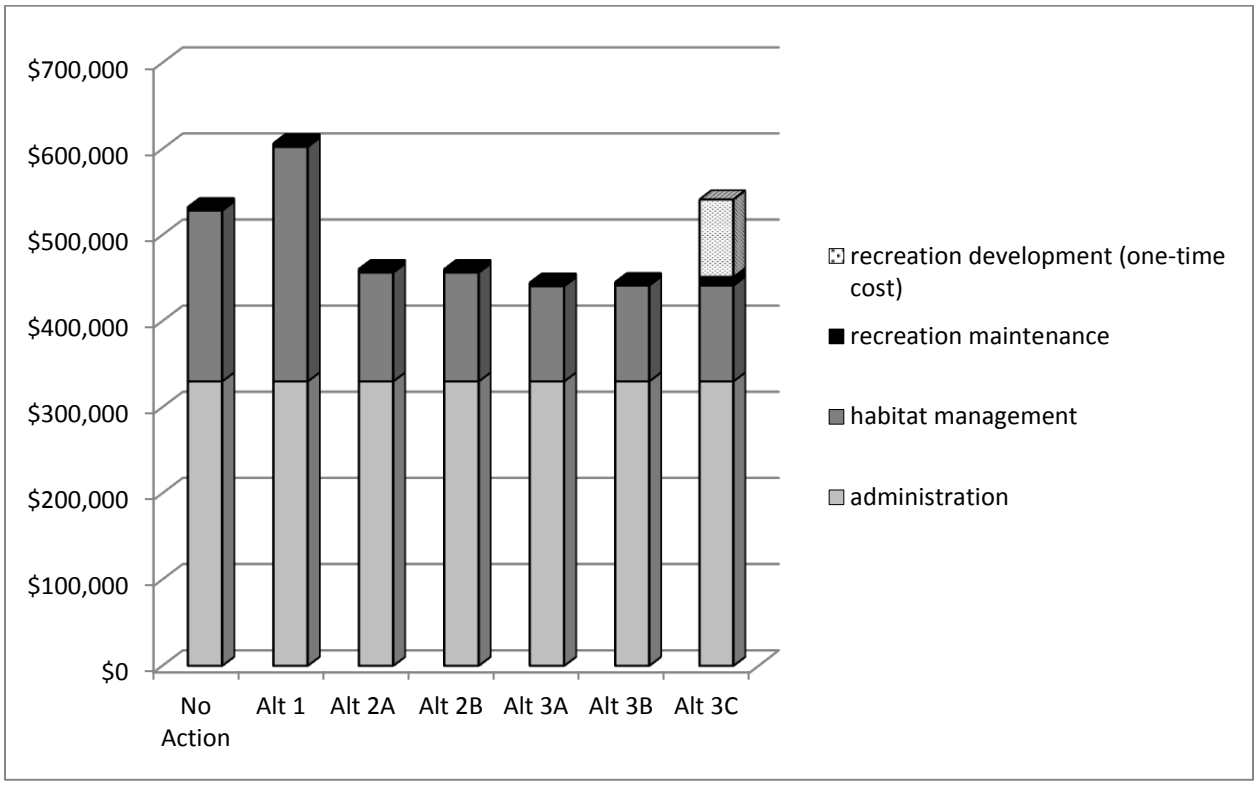
These costs are approximate and intended only to provide a relative comparison to other costs associated with BLM management and administration of the planning area. The costs for the construction and maintenance of the disc golf course proposed for Stewart Pond under Alternative 3C would be dependent on the specifics of the golf course development: a test course with natural tee pads and wooden target posts to test design concepts, safety, resource impacts and playability would cost $500; a permanent course with concrete tee pads, professional metal signs and official metal baskets would cost $15,000 (M. Benotsch, Eugene Disc Golf Club, *personal communication*, March 2, 2012). This analysis assumes the cost of the full and permanent construction. Some of the necessary maintenance of the disc golf course – occasional mowing to control woody plants - would be provided by the habitat management actions described in management direction under Alternative 3C. This analysis assumes that the remaining maintenance needed for the disc golf course would be provided by volunteers (M. Benotsch, Eugene Disc Golf Club, *personal communication*, March 2, 2012).

Under Alternative 3C, these new recreation developments would cost approximately $90,000 in one-time costs. These cost estimates assume full implementation of the potential recreation developments identified in Alternatives 3C. Under Alternative 3C, annual maintenance costs would be approximately $10,000 per year, compared to $4,000 per year for the other alternatives because of maintenance of new trails and maintenance of the concrete vault restroom. This estimate of maintenance costs does not include an increase in maintenance costs related to the construction of additional kiosks, picnic tables, benches, and signs under Alternative 3C. Vandalism of the structures could result in maintenance and replacement costs that are not included in this analysis.

Total annual costs for implementation of the alternatives, including administration, habitat management, and recreation maintenance, would be $532,000 for the No Action alternative, $606,000

for Alternative 1, $460,000 for Alternatives 2A and 2B, $445,000 for Alternative 3A, $445,000 for Alternative 3B, and $451,000 for Alternative 3C. In addition, Alternative 3C would include a one-time cost of $90,000 for recreation developments (Figure 28).

Figure 28. Cost of implementation by alternative (annual costs except where noted)



Chapter 5 - Consultation and Coordination

The Draft RMP/Draft EIS was prepared by an interdisciplinary team of Eugene District BLM staff. The planning process followed by the interdisciplinary team included public involvement, assistance from cooperators, government-to-government relationships, and consultation with other agencies.

Scoping

The formal scoping period started with printing of the Notice of Intent in the Federal Register on June 8, 2011, and concluded on July 8, 2011. In addition, the BLM sent a scoping letter to 49 individuals, organizations, and agencies that have an interest in BLM management within this planning area. On June 22, 2011, the Eugene Register-Guard newspaper published a news story on the West Eugene Wetlands RMP scoping process and provided contact information for scoping comments.

The BLM received thirteen comments during the formal scoping period and one comment after the close of the formal scoping period. Agencies and organizations providing comments included: the Environmental Protection Agency, the City of Eugene Parks and Open Space Division, the Long Tom Watershed Council, the North American Butterfly Association, The Nature Conservancy, Oregon Wild, and Friends of Eugene. All other comments were from individuals. One comment was submitted on a compact disc mailed to the BLM; one comment was provided as a telephone conversation; all other comments were submitted as email. The BLM received a comment letter after the close of the formal scoping period from the U.S. Army Corps of Engineers.

The BLM prepared a scoping report, which summarizes the results of scoping including a summary of the issues raised. The scoping report and scoping comments are available at: http://www.blm.gov/or/districts/eugene/plans/eugenermp.php.

Formal Cooperators

The Council on Environmental Quality NEPA regulations specify that a Federal agency, state agency, local government, or tribal government may qualify as a cooperating agency because of ". . . jurisdiction by law or special expertise."

> 1) Jurisdiction by law means ". . . agency authority to approve, veto, or finance all or part of the proposal." (40 CFR 1508.15).
> 2) Special expertise means ". . . statutory responsibility, agency mission, or related program experience." (40 CFR 1508.26).

Cooperators provide expertise in much of the subject matter being analyzed, and some cooperators can provide advice based on experiences with similar planning efforts. The BLM invited the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, City of Eugene Parks and Open Space Division, and the Confederated Tribes of Grand Ronde to be cooperators in the preparation of this RMP. The U.S. Army Corps of Engineers, City of Eugene Parks and Open Space Division, and the Confederated Tribes of Grand

Ronde agreed to be cooperators. The U.S. Fish and Wildlife Service declined the BLM invitation to be a cooperator.

Government-to-Government Relationships

The BLM invited potentially affected tribes - the Confederated Tribes of Grand Ronde, Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, the Confederated Tribes of Siletz Indians, and the Confederated Tribes of Warm Springs - to participate in government-to-government coordination in the development of this RMP. The BLM mailed scoping letters to the tribes providing information about the planning process and the planning area and inviting their involvement. None of the tribes provided any comments during the formal scoping period. In addition, the BLM telephoned cultural resources directors and natural resources managers of the tribes to inquire whether they needed additional information or would like to receive a briefing on the RMP. The Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians responded that they do not wish to be involved in the planning process, because the planning area is outside of their ancestral territory. Members of the RMP team have met several times with staff of the Confederated Tribes of Grande Ronde to provide more information on the RMP and the planning process; discuss development of the RMP; and receive input from the tribal staff.

Consultation

The BLM anticipates conducting a conservation review of the West Eugene Wetlands RMP with the U.S. Fish and Wildlife Service under section 7(a)(1) of the Endangered Species Act, in addition to formal consultation under section 7(a)(2). A conservation review under section 7(a)(1) will allow the BLM to gain the advice of the U.S. Fish and Wildlife Service earlier in the planning process than the formal consultation process under section 7(a)(2). This conservation review is appropriate for this planning process because of the unique conditions of this planning area, including the abundance of designated habitat in the planning area, the relationship of the Recovery Plan to the planning effort, and the central role of management of threatened and endangered species in the RMP.

As part of formal consultation under section 7(a)(2) of the Endangered Species Act, the BLM will prepare a Biological Assessment on the effect of the RMP on Fender's blue butterfly, Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, golden paintbrush, and designated critical habitat for Fender's blue butterfly, Willamette daisy, and Kincaid's lupine. Consultation on other threatened or endangered species found in the region, such as northern spotted owl, marbled murrelet, bull trout, or Oregon chub, will not be necessary, because there are no populations or existing or potential habitat for these species in the planning area.

Consultation with the National Marine Fisheries Service under the Endangered Species Act will not be necessary, because the planning area contains no threatened or endangered anadromous fish or designated critical habitat for listed anadromous fish.

List of Preparers

The following Eugene BLM staff members comprise the interdisciplinary team that was primarily responsible for the preparation of the Draft RMP/Draft EIS.

Cheryl Adcock – *realty*. Cheryl has a Bachelor's degree in Political Science from the University of Oregon. She has 22 years of experience working for the BLM and is currently a Natural Resource Supervisor in the Upper Willamette Resource Area, Eugene District. Cheryl's expertise is in lands and realty.

Karin Baitis – *soils and hydrology.* Karin has a B.S degree in Geography and a Master's degree in Geomorphology from the University of Oregon. She has seven years of natural resource experience working for private industry and eleven years of experience working for the BLM. She is currently the Soil Scientist in the Siuslaw Resource Area, Eugene District. Karin's expertise is in geology, hydrology and soils.

Eric Greenquist - *wildlife biology*. Eric is the lead wildlife biologist in the Eugene BLM District. He has a B.A. in Biology from the University of Missouri and an M.S. in Wildlife Ecology from Ohio University. During his 32 years with the BLM, Eric has worked (both in the United States and throughout the Americas) for the conservation of a variety of threatened and endangered species.

Richard Hardt - *team leader*. Richard has a Bachelor's degree in Natural Sciences from The Johns Hopkins University; a Master of Landscape Architecture degree from Harvard University; and a Ph.D. in Forest Resources from the University of Georgia. He has 18 years of experience working for the BLM and is currently the District Planner in the Eugene District. Richard's expertise is in forest ecology, land use planning, and NEPA.

Jay Ruegger - *geographic information systems*. Jay has a B.S. degree in Soil Science from Southern Illinois University. He has more than 20 years of experience working with geographic information systems and 10 years of experience as a field soil scientist with NRCS and BLM in Illinois, Arizona, and Nevada. Jay is currently the Eugene District GIS Coordinator.

Nancy Sawtelle – *botany.* Nancy has a Bachelor's degree in Wildlife Management from Oregon State University. She has worked for federal government for over 30 years, with the U.S. Forest Service PNW Station and the BLM. She is the Senior Staff Specialist Botanist/Plant Ecologist for the Eugene District BLM and coordinates the Botany Program, Natural Areas Program, and Native Plant Materials Program for the District.

Heather Ulrich – *archaeology.* Heather has a Bachelor's degree and a Master's degree in Anthropology from University of Oregon. Heather worked for the BLM while a student from 2007 to 2009 before becoming the District Archaeologist in both the Eugene and Salem Districts.

Heather's expertise is in Northwest Coast archaeology, cultural resource management, and faunal analysis.

Sally Villegas-Moore – *wildlife biology*. Sally is a wildlife biologist and now holds a Wetlands Natural Resource Specialist position in the Eugene District. Sally has two B.S. degrees, one in natural resources and the other in fisheries & wildlife, from Oregon State University. She has six years of experience as a wildlife biologist and seven years as a natural resource specialist working for BLM. Sally's expertise lies in restoring rare prairie habitats and works closely with the nine West Eugene Wetland partners to implement projects for the federally listed species.

The following additional Eugene BLM specialists assisted the interdisciplinary team: Eric Johnson, Fuels Specialist, and Wade Judy, Recreation Planner, BLM Eugene District. In addition, Craig Ducey, GIS/Remote Sensing Specialist, BLM Oregon/Washington State Office, assisted with FRAGSTATS analysis and GIS analysis of threatened and endangered species and habitat. Shawna Bautista, Wildlife Biologist, U.S. Forest Service, Region 6 PNW Regional Office, Portland, Oregon, assisted with modeling of herbicide effects.

List of Recipients of the Draft RMP/Draft EIS

The Draft RMP/Draft EIS will be distributed to the following individuals, organizations, agencies, and tribes:

Devon Bonady
Alison Center
Mitchell Cruzan
Patricia Duncan
Pam Hewitt
Bart Johnson
Eric Jones
Charles and Reida Kimmel
Christopher Looney
Bob Meinke
Neal Miller
David Moen
Janet Mongillo
Bruce Newhouse
Kari Marie Norgaard
Ethan Perkins
John Poynter
Bart Pratt
Barbara Roy
Peter Saraceno
Cheryl Schultz

Darren and Shelly Senseney
Paul Severns
David Simone
Julie Thomason
Craig Tupper
Tim Whitley
Molly Widmer
Rudy Wiedenbeck
Jan Wroncy
Bob Zybach
Backcountry Horseman of Oregon
Cascadia Wildlands Project
Friends of Eugene
Institute for Applied Ecology
John Muir Project
Long Tom Watershed Council
McKenzie River Trust
Oregon Equestrian Trails
Oregon Wild
Oregon Youth Conservation Corps
Roseburg Forest Products
Swanson Group Inc.
The Berry Botanic Garden
The Nature Conservancy
WREN
City of Eugene Parks & Open Space Division
Lane County Land Management Planning
Governor of Oregon
Governor's Natural Resources Office
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Transportation
U.S. Army Corps of Engineers
USDA Forest Service Pacific Northwest Research Station
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
The Confederated Tribes of Grand Ronde
The Confederated Tribes of Siletz Indians
The Confederated Tribes of Warm Springs

Instead of receiving a hard copy of the documents, some of the recipients on this list have requested email notification when the documents have been posted to the Eugene District website. The Draft

RMP/Draft EIS will also be distributed to other recipients upon request and will be available on the Eugene District website at:
http://www.blm.gov/or/districts/eugene/plans/eugenermp.php

Acronyms and Abbreviations

ACEC – Area of Critical Environmental Concern
BLM – Bureau of Land Management
BMP – best management practice
BPA – Bonneville Power Administration
CEQ – Council on Environmental Quality
CFR – Code of Federal Regulations
CO – carbon monoxide
DNA – Determination of NEPA Adequacy
EA – environmental assessment
EC_{50} - median effect concentration
EIS – environmental impact statement
EPA – Environmental Protection Agency
EWEB – Eugene Water and Electric Board
GIS – geographic information systems
GLEAMS - Groundwater Loading Effects of Agricultural Management Systems
HQ – hazard quotient
KOC - soil organic carbon-water partitioning coefficient
l - liter
LC_{50} - median lethal concentration
m – meter
mg - milligram
NEPA – National Environmental Policy Act
NO_x – nitrogen oxides
NOAEC – no observed adverse effect concentration
NOEC – no observed effect concentration
NOEL - no observed effect level
O&C Act - Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act
O&C lands – Oregon and California lands
pH – potential of hydrogen
$PM_{2.5}$ – particular matter less than or equal to 2.5 micrometers
PM_{10} – particular matter less than or equal to 10 micrometers
ppm – parts per million
RfD - reference dose
RMP – resource management plan
U.S. – United States
USC – United States code
USFWS – U.S. Fish and Wildlife Service
WEW – West Eugene Wetlands

Glossary

This section provides definitions of terms used in this document that may not be found in a standard dictionary or have a specific or specialized meaning in this document.

absorption. The permeation or dissolution of a fluid into a liquid or solid.

acute exposure. A single exposure or multiple brief exposures occurring within a short time (e.g., 24 hours or less in humans). The classification of multiple brief exposures as "acute" is dependent on the life span of the organism.

adsorption. The adhesion of atoms, ions, or molecules from a gas, liquid, or dissolved solid to a surface.

aerobic. Life or processes that require, or are not destroyed by, the presence of oxygen.

anadromoU.S. Fish. Fish that mature in the sea and swim up freshwater rivers and streams to spawn, such as salmon, steelhead, and sea-run cutthroat trout.

anaerobic. Life or processes that take place without oxygen.

annual (plant). A plant whose life cycle is completed in one year or season.

archaeological sites. Locations on the landscape that contain the physical remains of past human activities.

Area of Critical Environmental Concern (ACEC). Land where special management attention is needed to protect life, to provide safety from natural hazards, or to prevent irreparable damage to important values (historic, cultural, or scenic), resources (fish and wildlife), or processes (natural systems).

augmentation. Planting of plugs or seeding to increase plant populations.

Best Management Practices (BMPs). Methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).

chert. A fine-grained sedimentary rock, often used in the construction of tools.

chronic exposure. Exposures that extend over a long period. Chronic exposure studies are used to evaluate the carcinogenic potential of chemicals and other long-term health effects.

class 1/class 2/class 3. Site quality classifications in the planning area made in the West Eugene Wetlands Schedule Environmental Assessment (BLM 2005). Class 1 (red sites) are the best quality habitats; Class 2 (blue sites) are intermediate quality habitats; and Class 3 (green sites) are the lowest quality habitats. These are relative classifications based on current conditions; although Class

1 sites are the best quality in the planning area at this time, they do not currently meet the criteria for high quality habitat (see the definitions of plant communities below).

clastic. Rocks composed of fragments of pre-existing minerals and rock fragments.

conformance. A proposed action shall be specifically provided for in the land use plan or, if not specifically mentioned, shall be clearly consistent with the goals, objectives, or standards of the approved land use plan.

critical habitat. An Endangered Species Act term denoting a specified geographic area occupied by a federally listed species, and on which the physical and biological features are found that are essential to the conservation and recovery of that species and that may require special management or protection.

cultural resources. The locations and materials contained within archaeological, historical or traditional use sites.

debitage. Flakes or chips of stone created in stone tool-making.

delist. To remove a plant or animal species from the list of endangered or threatened species.

Determination of NEPA Adequacy (DNA). An interim step in the BLM's internal analysis process that concludes that a proposed action is adequately analyzed in an existing NEPA document (an EIS or EA). Where applicable, the determination also addresses conformance with an approved land use plan.

diapause. A state of dormancy, such as a moth pupa in a cocoon.

downlist. To change the status of an endangered species to threatened.

drift. That part of a sprayed chemical that is moved by wind off a target site.

EC_{50}. Median effect concentration in air or in water that causes 50% inhibition of growth.

endangered species. An animal or plant species, listed by the U.S. Fish and Wildlife Service or National Marine Fisheries Service, as being in danger of extinction throughout all or a significant portion of its range.

half-life. The amount of time required for half of a compound to degrade.

haying. Gathering the cut herbaceous vegetation created by mowing.

Hazard Quotient (HQ). The ratio of the estimated level of exposure to a substance from a specific substance from a specific pesticide application to the reference dose for that substance, or to some other index of acceptable exposure or toxicity.

historic sites. Artifacts, features, or structures that are older than 50 years.

hydrolysis. Chemical decomposition induced by water.

imogolite. A noncrystalline, amorphous clay mineral.

invasive plants. Plants that 1) are not part of (if exotic), or are a minor component of (if native), the original plant community or communities; 2) have the potential to become a dominant or co-dominant species on the site if their future establishment and growth is not actively controlled by management interventions; or 3) are classified as exotic or noxious plants under state or federal law.

larva. A distinct wingless juvenile form of many insects before metamorphosis.

LC_{50}. Median lethal concentration of a chemical in air or water to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

leaching: the movement of chemicals through the soil by water.

level of concern. The concentration in media or some other estimate of exposure above which there may be effects.

listed species. An animal or plant species, listed by the U.S. Fish and Wildlife Service or National Marine Fisheries Service, as threatened or endangered.

lithologies. The physical characteristics of a rock unit.

litter. The uppermost layer of organic debris on the soil surface, which is essentially the freshly fallen or slightly decomposed vegetation material, such as stems, leaves, twigs, and fruits.

macrophyte. A plant, especially a marine or aquatic plant, large enough to be visible to the naked eye.

manual treatments. The physical removal of herbaceous or woody plants using hand-held tools, such as shovels, hand-held mowers, chainsaws.

mastication. Mechanical crushing and chopping of vegetation, especially woody vegetation.

mechanical treatments. The physical removal of herbaceous or woody plants using mechanized tools, such as mowers and tractors.

metabolism. The set of chemical reactions happening within a cell or a whole organism.

metabolite. A substance produced during metabolism.

minerals, leasable. Minerals generally found in bedded deposits and include oil, gas, coal, chlorides, sulfates, carbonates, borates, silicates, and nitrates of potassium (potash) or sodium and related products; sulfur; phosphate and its associated and related minerals; asphalt; and gilsonite.

minerals, locatable. Metallic minerals (gold, silver, lead, copper, zinc, nickel, etc.) and nonmetallic minerals (fluorspar, mica, certain limestone and gypsum, tantalum, heavy minerals in placer form and gemstones) in land belonging to the United States that are open to citizens of the United States for exploration, discovery, and location which conveys the exclusive right to extract the locatable minerals upon receiving all required authorizations in accordance with regulations at 43 CFR 3802 for lands in wilderness review and 3809 for other public lands.

minerals, saleable. Minerals including but not limited to: petrified wood and common varieties of sand, stone, gravel, pumice, pumicite, cinder, clay, and rock.

montmorillonite. A crystalline, layered, silicate clay with high water-holding capacity.

mowing. Cutting herbaceous vegetation by either mechanical or manual means.

nectar plant: A particular plant species required by adult butterflies for food or energy.

no observed adverse effect concentration (NOAEC). The maximum concentration of the tested compound that has no adverse effects on the test organisms.

no observed effect concentration (NOEC). The maximum concentration of the tested compound that has no effect on the test organisms.

no observed effect level (NOEL). Exposure level at which there are no statistically or biological significant differences in the frequency or severity of any effect in the exposed or control populations.

non-attainment area. A geographic area that has not consistently met the clean air levels set by the U.S. Environmental Protection Agency in the National Ambient Air Quality Standards.

non-vascular plants. Those plants without a vascular system for conducting water, minerals, and photosynthetic products through the plant, including mosses, liverworts, and hornworts.

non-selective herbicide. An herbicide that is generally toxic to plants without regard to species.

noxious weed. A subset of invasive plants that are county, state, or federally listed as injurious to public health, agriculture, recreation, wildlife, or any public or private property.

O&C lands. Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States. O&C lands are only in Oregon, and most are managed by the BLM.

obsidian. A volcanic glass, often used in the construction of tools.

particulate matter (PM). A complex mixture consisting of varying combinations of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These tiny particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust.

perennial (plant). A plant that lives for two or more years.

pH (potential of hydrogen). A measure of how acidic or alkaline a solution is on a scale of 0 to 14, with 0 being very acidic, 7 being neutral, and 14 being very alkaline.

photolysis. Chemical decomposition induced by light or other radiant energy.

planning area. The geographic area within which the BLM will make decisions through this RMP.

planning area boundary. The broader geographic area surrounding the planning area, including all land ownerships.

plant communities. A group of plant populations that coexist in space and time and interact with one another. The plant communities referenced in this document include:

- **open water**: ponds that contain water year round.
- **freshwater/riverine**: the channel and banks of streams and rivers.
- **emergent wetlands**: deep (approximately 8 to 36 inches deep at full pool), yet ephemeral, wetlands, which fill annually from precipitation or runoff and become completely dry by late summer. In most analyses in this document, emergent wetlands are included in wet prairies.
- **vernal pools**: shallow (approximately 1 to 8 inches deep at full pool) ephemeral wetlands, which fill annually from precipitation or runoff and become completely dry by early summer. In most analyses in this document, vernal pools are included in wet prairies.
- **low quality wet prairie**: seasonally inundated or saturated grasslands that do not meet all of the essential "Prairie Quality and Diversity" guidelines described in the Recovery Plan.
- **high quality wet prairie**: seasonally inundated or saturated grasslands that meet all of the essential "Prairie Quality and Diversity" guidelines described in the Recovery Plan.
- **low quality upland prairie**: grasslands that are not seasonally inundated or saturated and do not meet all of the essential "Prairie Quality and Diversity" guidelines described in the Recovery Plan.
- **high quality upland prairie**: grasslands that are not seasonally inundated or saturated and meet all of the essential "Prairie Quality and Diversity" guidelines described in the Recovery Plan.
- **low quality oak savanna**: lightly forested grasslands with less than 30% canopy cover of trees, predominately oaks, that do not meet all of the essential "Prairie Quality and Diversity" guidelines described in the Recovery Plan.
- **high quality oak savanna**: lightly forested grasslands with less than 30% canopy cover of trees, predominately oaks, that meet all of the essential "Prairie Quality and Diversity" guidelines described in the Recovery Plan.
- **oak woodland**: forests with greater than 30% canopy cover of trees, predominately oaks.
- **ash swale/riparian**: forested areas, predominately Oregon ash, that are seasonally inundated or saturated.
- **plantation**: a stand of planted trees.
- **Douglas-fir forest**: forests with predominately Douglas-fir in the overstory.

Additional information on the definition of plant communities used in this document can be found in BLM 2005 (pp. 19-22).

plugs. Seedlings, cuttings, or vegetative plant materials used for planting.

population. A discrete group of individuals of a species occupying a defined area.

prescribed burning. An intentional ignition of grass, shrub, or forest fuels for specific purposes according to predetermined conditions.

public domain lands. Original holdings of the United States that were never granted or conveyed to other jurisdictions or never reacquired by exchange for other public domain lands.

recovery plan. A plan for the conservation and survival of an endangered species or a threatened species listed under the Endangered Species Act for the purpose of improving the status of the species to the point where listing is no longer required.

redoximorphic. Features associated with prolonged wetness, which result from alternating periods of reduction and oxidation of iron and manganese compounds.

reference dose (RfD). An estimate of a daily oral exposure to the human population (including sensitive subgroups) that is likely to not result in an appreciable risk of deleterious effects during a lifetime. It is derived from the no observed adverse effect level, the lowest observed adverse effect level, or a benchmark dose. Uncertainty factors are applied when developing the reference dose so the RfD incorporates additional protection to account for the range of uncertainties in the data used.

resource management plan (RMP). A BLM planning document, prepared in accordance with Section 202 of the Federal Land Policy and Management Act that presents systematic guidelines for making resource management decisions for a specific geographic area.

rhyolite. A silica-rich, volcanic rock.

risk. The likelihood that a given exposure to an item or substance that presents a certain hazard will produce illness or injury.

risk assessment. The process of gathering data and making assumptions to estimate short- and long-term harmful effects on human health or the environment from particular products or activities.

selective herbicide. A chemical designed to affect only certain types of plants, leaving other plants unharmed.

senescence. Dying off at the end of a season (annuals) or approaching dormancy (perennials).

sensitive species. A special status species category established by the BLM that includes those plant and animal species eligible for status as federally listed, federal candidate, state listed, or state candidate (plant) species; on List 1 of the Oregon Natural Heritage Database or approved for this category by the BLM state director; or included under agency species conservation policies.

shade cloth. A vegetation control technique in which the target plants are covered with a dark cloth, which typically remains in place for two years, killing the target plants.

snag. A standing dead tree, usually larger than 5 feet tall and 6 inches in diameter at breast height.

solarization. A vegetation control technique in which the target plants are covered with plastic sheeting, which typically remains in place for the subsequent growing season, killing the target plants.

split estate. The surface rights and subsurface rights (such as the rights to develop minerals) for a piece of land are owned by different parties.

strategic species. A special status species category established by the Oregon/Washington BLM that includes animal, plant and fungi species that are of concern in the two states. The special status

species policy (BLM 6840) does not apply to these species, and no analysis of them is required in NEPA documents. Field units are required to collect occurrence field data and maintain records.

surfactant. A material that improves the emulsifying, dispersing, spreading, wetting, or other surface-modifying properties of liquids. Surfactants are often added to herbicides to increase coverage on target vegetation.

survey hiatus. A gap between survey lines that results in the identification of public domain land where none was previously known to exist.

thatch. The dense covering of cut vegetation that remains after mowing, which can inhibit the growth of new plants.

thermal treatments. A vegetation control technique in which the target plants are burned in a spot treatment of heat or fire, such as with a hand-held propane torch.

thinning. Cutting some but not all of the trees in an area.

threatened species. An animal or plant species, listed by the U.S. Fish and Wildlife Service or National Marine Fisheries Service, as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

tiering. Using the coverage of general matters in broader NEPA documents in subsequent, narrower NEPA documents (40 CFR 1508.28, 40 CFR 1502.20).

traditional use sites. Areas identified by local Native American tribes as being important to those living communities' historically rooted practices, customs and beliefs.

trespass. Any use, occupancy, or development of the public lands, other than casual use, without authorization.

Travel Management Area. A delineated area where travel management (either motorized or non-motorized) requires particular focus. These areas may be designated as open, closed, or limited to motorized use and will typically have an identified or designated network of roads, trails, ways, and other routes that provide for public access and travel across the planning area.

vascular plants. Those plants that have specialized tissues for conducting water, minerals, and photosynthetic products through the plant, such as ferns, grasses, shrubs, and trees.

wetlands. Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstance do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

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Appendix A - Legal Authorities

The following is a list of the major legal authorities that are most relevant to the BLM land use planning process. It is not a complete list of all legal authorities that direct BLM management.

- The Federal Land Policy and Management Act of 1976, as amended, 43 USC 1701 et seq., provides the authority for BLM land use planning.
  - Sec. 102 (a) (7) and (8) sets forth the policy of the United States concerning management of the public lands.
  - Sec. 201 requires the Secretary of the Interior to prepare and maintain an inventory of the public lands and their resource and other values, giving priority to areas of critical environmental concern, and, as funding and workforce are available, to determine the boundaries of the public lands, provide signs and maps to the public, and provide inventory data to State and local governments.
  - Sec. 202 (a) requires the Secretary, with public involvement, to develop, maintain, and when appropriate, revise land use plans that provide by tracts or areas for the use of the public lands.
  - Sec. 202(c)(1-9) requires that, in developing land use plans, the BLM shall use and observe the principles of multiple use and sustained yield; use a systematic interdisciplinary approach; give priority to the designation and protection of areas of critical environmental concern; rely, to the extent it is available, on the inventory of the public lands; consider present and potential uses of the public lands; consider the relative scarcity of the values involved and the availability of alternative means and sites for realizing those values; weigh long-term benefits to the public against short term benefits; provide for compliance with applicable pollution control laws, including State and Federal air, water, noise, or other pollution standards or implementation plans; and consider the policies of approved State and tribal land resource management programs, developing land use plans that are consistent with State and local plans to the maximum extent possible consistent with Federal law and the purposes of this Act.
  - Sec. 202 (d) provides that all public lands, regardless of classification, are subject to inclusion in land use plans, and that the Secretary may modify or terminate classifications consistent with land use plans.
  - Sec. 202 (f) and Sec. 309 (e) provide that Federal, State, and local governments and the public be given adequate notice and an opportunity to comment on the formulation of standards and criteria for, and to participate in, the preparation and execution of plans and programs for management of the public lands.
  - Sec. 302 (a) requires the Secretary to manage BLM lands under the principles of multiple use and sustained yield, in accordance with available land use plans developed under Sec. 202 of the Federal Land Policy and Management Act. There is one

exception: where a tract of the BLM lands has been dedicated to specific uses according to other provisions of law, it shall be managed in accordance with such laws.
  - Sec. 302 (b) recognizes the entry and development rights of mining claimants, while directing the Secretary to prevent unnecessary or undue degradation of the public lands.
  - Sec. 701 (b) provides that notwithstanding any provision of the Federal Land Policy and Management Act, in the event of conflict with or inconsistency between the Federal Land Policy and Management Act and the O&C Act, insofar as they relate to management of timber resources and disposition of revenues from lands and resources, the O&C Act shall prevail.
- The National Environmental Policy Act of 1969 (NEPA), as amended, 42 USC 4321 et seq., requires the consideration and public availability of information regarding the environmental impacts of major Federal actions significantly affecting the quality of the human environment. This includes consideration of alternatives and mitigation of impacts.
- The Endangered Species Act of 1973, as amended, 16 USC 1531 et seq.:
  - Provides a means whereby the ecosystems upon which endangered and threatened species depend may be conserved and provides a program for the conservation of such endangered and threatened species (Sec. 1531 [b], Purposes).
  - Requires all Federal agencies to seek to conserve endangered and threatened species and utilize applicable authorities in furtherance of the purposes of the Endangered Species Act (Sec. 1531 [c] [1], Policy).
  - Requires all Federal agencies to avoid jeopardizing the continued existence of any species that is listed or proposed for listing as threatened or endangered, or destroying or adversely modifying its designated or proposed critical habitat (Sec. 1536 [a], Interagency Cooperation).
  - Requires all Federal agencies to consult (or confer) in accordance with Sec. 7 of the Endangered Species Act with the Secretary of the Interior, through the Fish and Wildlife Service and/or the National Marine Fisheries Service, to ensure that any Federal action (including land use plans) or activity is not likely to jeopardize the continued existence of any species listed or proposed to be listed under the provisions of the Endangered Species Act, or result in the destruction or adverse modification of designated or proposed critical habitat (Sec. 1536 [a], Interagency Cooperation, and 50 CFR 402).
- The Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act) (43 USC 1181a, et seq.) provides the legal authority for management of O&C lands by the Secretary of the Interior. The O&C Act requires that the O&C lands be managed "for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal (sic) of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." (43 USC 1181a)

- The Clean Air Act of 1990, as amended, 42 USC 7418, requires Federal agencies to comply with all Federal, State and local requirements regarding control and abatement of air pollution. This includes abiding by requirements of State Implementation Plans.
- The Clean Water Act of 1987, as amended, 33 USC 1251, establishes objectives to restore and maintain the chemical, physical, and biological integrity of the Nation's water.
- The Healthy Forests Restoration Act of 2003, 16 USC 6501, contains a variety of provisions to expedite hazardous-fuel reduction and forest-restoration projects on specific types of Federal land that are at risk of wildland fire or insect and disease epidemics. It also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on lands of all ownerships.
- The Federal Water Pollution Control Act, 33 USC 1323, requires Federal land managers to comply with all Federal, State, and local requirements, administrative authorities, process, and sanctions regarding the control and abatement of water pollution in the same manner and to the same extent as any nongovernmental entity.
- The Safe Drinking Water Act, 42 USC 201, is designed to make the Nation's waters "drinkable" as well as "swimmable." Amendments in 1996 establish a direct connection between safe drinking water and watershed protection and management.
- The Migratory Bird Treaty Act of 1918 decrees that all migratory birds and their parts (including eggs, nests, and feathers) are fully protected. The Migratory Bird Treaty Act is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource.
- The Antiquities Act of 1906, 16 USC 431-433, protects cultural resources on Federal lands and authorizes the President to designate National Monuments on Federal lands.
- The National Historic Preservation Act (NHPA), as amended, 16 USC 470, expands protection of historic and archaeological properties to include those of national, State, and local significance and directs Federal agencies to consider the effects of proposed actions on properties eligible for or included in the National Register of Historic Places. It also directs the pro-active management of historic resources.
- The American Indian Religious Freedom Act of 1978, 42 USC 1996, establishes a national policy to protect and preserve the right of American Indians to exercise traditional Indian religious beliefs or practices.
- The Recreation and Public Purposes Act of 1926, as amended, 43 USC 869 et seq., authorizes the Secretary of the Interior to lease or convey BLM lands for recreational and public purposes under specified conditions.
- The Mineral Leasing Act of 1920, as amended, 30 USC 181 et seq., authorizes the development and conservation of oil and gas resources.
- The General Mining Law of 1872, as amended, 30 USC 21 et seq., allows the location, use, and patenting of mining claims on sites on public domain lands of the United States.
- The Mining and Mineral Policy Act of 1970, 30 USC 21a, establishes a policy of fostering the orderly development of economically stable mining and minerals industries and studying methods for reclamation and the disposal of waste.

- Executive Orders 11644 (1972) and 11989 (1997) establish policies and procedures to ensure that off-road vehicle use shall be controlled so as to protect public lands.
- Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations), 49 Fed. Reg. 7629 (1994), requires that each Federal agency consider the impacts of its programs on minority and low-income populations.
- Executive Order 13007 (Indian Sacred Sites), 61 Fed. Reg. 26771 (1996), requires Federal agencies to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions to:
    - accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners; and
    - avoid adversely affecting the physical integrity of such sacred sites.
- Executive Order 13084 (Consultation and Coordination with Indian Tribal Governments) provides, in part, that each Federal agency shall establish regular and meaningful consultation and collaboration with Indian tribal governments in developing regulatory practices on Federal matters that significantly or uniquely affect their communities.
- Executive Order 13112 (Invasive Species) provides that no Federal agency shall authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk or harm will be taken in conjunction with the actions.
- Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs the Fish and Wildlife Service, in coordination with Federal agencies and Executive departments, to take certain actions to further the implementation of the Migratory Bird Treaty Act in promoting conservation of migratory bird populations.
- Executive Order 13443 (Facilitation of Hunting Heritage and Wildlife Conservation) provides, in part, that Federal agencies shall, consistent with agency missions evaluate the effects of agency actions on game species and their habitats; manage wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities; work collaboratively with State governments to manage and conserve game species and their habitats; and seek the advice of State fish and wildlife agencies.
- Secretarial Order 3175 (incorporated into the Departmental Manual at 512 DM 2) requires that if Department of the Interior agency actions might impact Indian trust resources, the agency must explicitly address those potential impacts in planning and decision documents, as well as consult with the tribal government whose trust resources are potentially affected by the Federal action.
- Secretarial Order 3206 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act) requires Department of the Interior agencies to consult with Indian tribes when agency actions to protect a listed species, as a result of compliance with the Endangered Species Act, affect or may affect Indian lands, tribal trust resources, or the exercise of American Indian tribal rights.

- Secretarial Order 3215 (Principles for the Discharge of the Secretary's Trust Responsibility) guides Department of the Interior officials by defining the relatively limited nature and extent of Indian trust assets, and by setting out the principles that govern the Trustee's fulfillment of the trust responsibility with respect to Indian trust assets.

Appendix B – Valid Existing Rights and Continuing Uses

Table 30. Valid existing rights and continuing uses in the planning area by site

Map No.	Name	Serial No.	Deed signed	Acres	Valid Existing Rights
1	Eastern Gateway	OR 48444	11/3/92	16.85	City drainage ditches, public utilities
2	Stewart Pond	OR 48585	8/20/93	8.848	Public rights on Bailey Hill Rd
3	Stewart Pond	OR 48588	12/22/93	12.34	
4	Stewart Pond	OR 49375	9/9/93	6.5	City utilities (underground & overhead); City 10-foot slope easement; City right-of-way & utilities
5	Stewart Pond	OR 49367	6/30/94	41.51	City utilities
6	Stewart Pond	OR 48446	4/1/94	10.18	
7	Burley	OR 50498	12/22/94	3.054	
8	Burley	OR 52092	4/10/97	0.57	City easement
9	Burley	OR 52093	2/25/97	0.448	
10	Willow Creek Confluence	OR 48463	10/15/93; 5/31/96	3.4	Amazon canal channel easement
11	Speedway	OR 56179	4/30/02; 5/13/03	4.2	Storm drainage & sewer easement
12	Speedway	OR 54027	9/19/00	32.71	City easement & construction permit
13	Speedway	OR 54338	1/2/02	46.12	Conservation easement, City sewer easement and construction permit, easement
14	Willow Creek Confluence	OR 54854	6/26/00	4.69	Public rights on County road, City WEW buffer
15	Red House (Danebo)	OR 23598	9/21/79	12.36	
16		OR 48462	12/19/94	12.27	Public access to Danebo Street, waterline easement, pipeline easement
17	Balboa	OR 48441	5/12/94	69.97	Maintenance for Amazon Canal, City sewer easement, City powerline easement, City bike path easement, City canal easement, City utilities easement, private sewerline easement, EWEB underground utilities easement, WEW channel enhancement easement, Lane Memorial Gardens waterline easement

18	Rosy	OR 54424	4/7/99	2.7	City utility easement, 3 "no build" or WEW buffer restrictions
19	Nolan	OR 53388	9/5/97	1.03	BPA powerline easement, City powerline easement, City utility easement
20	Oxbow West	OR 48443	5/30/94; 10/13/94	25.29	State of Oregon for Amazon Canal, Mountain States power easement, City powerline easement, Cone canal easement
21	Oxbow West	OR 54610	3/16/00	10.55	City easement, 3 reservations for WEW buffers and drainage maintenance agreement
22	Vinci	OR 48587	9/11/98	52.86	Mountain State powerline easement, public road and utility easements, Davidson Industries railroad spur easement, City powerline easement, water protection and WEW buffer reservation
23	Oxbow West	OR 48582	3/14/96	21.95	Mountain State powerline easement
24	Oxbow East	OR 49366	3/27/96	39.77	Mountain State powerline easement, private utility easement, EWEB utility easement, City easement for Amazon Channel and bike path, City utility easement, City construction easement
25	Summer Oaks	OR 48581	4/15/96	55.16	State of Oregon for Amazon Canal, Cone sewer easement, City channel easement
26	Spectra Physics	OR 52335	9/17/97	46.76	Private well & waterline easement, WEW mitigation measures
27	Nielson	OR 48589	2/10/93	58.83	Mountain States powerline easement, private well & waterline easement
28	Larson	OR 50850	12/12/94	53.21	Public rights on Greenhill Road, private road, waterline & buried powerline easements
29	Turtle Swale	OR 49374	9/20/94	25.38	
30	Turtle Swale	OR 48592	2/10/95	32.55	Public rights for County road, Amazon Water District channel easement
31	Turtle Swale	OR 52354	7/16/96	0.325	City easement
32	Fir Butte	OR 52334	4/29/97	18.2	
33	Greenhill	OR 48590	11/15/93	79.39	EWEB powerline easements, private road, waterline, phone & powerline easements

34	Oak Hill	OR 52512	2/10/98; 7/17/06	9.11	BPA powerline easement, City powerline easement, City utility easement
35	Isabelle	OR 52332	4/11/97	5.04	Public utility easements, WEW buffer restrictions
36	Oak Hill	OR 51894	1/26/96	44.12	BPA powerline easements, EWEB powerline easement,
37	Hansen	OR 51144	8/26/94	134.33	Deed restrictions, Farmers Home Administration easement
38	Hansen	OR 54629	9/2/99	8.42	
39	North and South Taylor	OR 48077P5	2/5/97	310.4	
40C		OR 51673	3/5/01	6.08	
41C		OR 54856	3/2/99	9.69	
42C		OR 54855	4/5/99	8.77	
43C		OR 54958	8/20/99	19.52	
44C		OR 55086	11/10/00	6.36	
45C		OR 55454	11/23/99	22.2	
46C		OR 57414	8/28/02	23.44	

Appendix C – Best Management Practices

A Best Management Practice (BMP) is a practice, or combination of practices that have been determined to be the most effective and practicable in preventing or reducing the amount of pollution generated by diffuse sources to a level compatible with water quality goals (40 CFR 130.2 [m]). BMPs are a type of water pollution control. This section defines the best management practices (i.e., methods and measures) that were developed for the lands within the planning area to comply with the requirements of the Clean Water Act. Those BMPs that are necessary for typical situations have been included. When applied, BMPs are expected to prevent water quality degradation and to meet water quality standards.

Best management practices are required by the amended federal Clean Water Act to reduce nonpoint source pollution to the maximum extent practicable. Nonpoint source pollution is pollutants detected in a concentrated water source such as a stream, or lake that come from a wide range of land management activities. The BMPs are considered the primary controls for achieving Oregon's water quality standards. Oregon's narrative criteria, which include numeric standards, are designed to protect designated beneficial uses (such as resident fish and aquatic life, domestic water supplies, and water-contact recreation). The BMPs are methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level. The BMPs include, but are not limited to, avoidance, structural and nonstructural treatments, operations, and maintenance procedures. Although normally preventative, BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).

Some BMPs that relate to instream activities may coincidently be similar to applicable practices specified in U.S. Army Corps of Engineers, Department of State Lands, and Oregon Department of Fish and Wildlife joint removal/fill permits, Department of Environmental Quality water quality permits and 401 certifications, or project design criteria contained in biological assessments. The BMPs in the following tables are not specific permit requirements, but rather demonstrate the process by which nonpoint source pollution from instream activities would be controlled.

Selection of BMPs is made by resource specialists during project-level analyses. It is not intended that all of the BMPs listed would be selected for any specific management action. Each activity is uniquely based on site-specific conditions, and the selection of an individual BMP or a combination of BMPs and measures would become the BMP design.

The BMPs would be applied in a manner that would be consistent with all RMP objectives. The overall goal would not be to adhere strictly to a particular set of BMPs, but to meet water quality objectives when implementing management actions. Describing non-point pollution causal mechanisms would allow specialists to exercise discretion as to what would work best in a particular situation. Although this appendix does not provide an exhaustive list of BMPs, the included BMPs are believed to cover most project activity situations in the planning area. Additional nonpoint source control measures may be

identified during the interdisciplinary process when evaluating site-specific management actions and implemented during planned actions.

Where found to be ineffective, BMPs may require modification to meet water quality objectives. Specialists may consider baseline environmental conditions, type of activity, proximity to water, disturbance level, direct, indirect, and cumulative effects and timing. They may also evaluate new technology and relevant implementation or effectiveness monitoring data, published studies or other sources of information, in refining existing BMPs or recommending new BMPs. This process involves continued learning and applying monitoring feedback.

Review and update of this appendix, including BMP corrections or additions that are derivatives of existing BMPs, would be completed through plan maintenance.

In addition to the BMPs listed below, the standard operating procedures for herbicide application related to Water Resources would constitute additional BMPs to meet water quality objectives for the alternatives that would propose herbicide use (Appendix E).

Habitat Restoration

- Recontour ditches to reroute water for retention on site.
- Plant native vegetation to stabilize head cutting and piping at actively eroding sites.
- Encourage streams to reconnect with floodplain when possible using check-dams.
- Do not allow grazing animals within 50 feet of any stream or river channel.
- Design soil-disturbing restoration techniques (where disruption of nitrogen removal, sediment stabilization, and phosphorus retention might occur) to protect functionality of wetland and riparian sites.
- Place protective barriers around specified staging areas, drainages, ditches, and stream edges as needed to minimize sedimentation. Remove protective barriers after project completion.
- Construct sediment traps/retention ponds, as needed, during project implementation to intercept runoff from disturbed areas. Locate sediment traps/retention ponds away from natural stream channels. The sediment traps/retention ponds should be adequate in size and number to provide for storm events and predicted sediment accumulation.
- Use certified weed-free native straw mulch or geo-textiles to minimize erosion from bare soils adjacent to streams, ditches or drainage ways and prevent the introduction of undesirable weeds.

Spill Prevention and Abatement

- Inspect and clean heavy equipment as necessary prior to moving on to the project site, in order to remove oil and grease, noxious/invasive weeds, and excessive soil.
- Inspect hydraulic fluid and fuel lines on heavy-mechanized equipment for proper working condition.
- Where possible, maintain and refuel equipment a minimum of 100 feet away from streams and other waterbodies.
- All mixing of herbicides will occur at least 100 feet from surface waters or well heads.

- All hoses used to add dilution water to spray containers will be equipped with a device to prevent back-siphoning.
- Applicators will mix only those quantities of herbicides that can be reasonably used in a day.
- Equipment used for transportation, storage, or application of chemicals shall be maintained in a leak-proof condition.
- In the event of a spill or release, all reasonable and safe actions to contain the material will be taken. Specific actions are dependent on the nature of the material spilled.
- Use spill containment booms or as required by Department of Environmental Quality. Have access to booms and other absorbent containment materials.
- Immediately remove waste or spilled hazardous materials (including but not limited to herbicides, diesel, oil, hydraulic fluid) and contaminated soils near any stream or other waterbody, and dispose of it/them in accordance with the applicable regulatory standard. Notify Oregon Emergency Response System of any spill over the material reportable quantity, and any spill not totally cleaned up after 24 hours.
- Store equipment containing reportable quantities of toxic fluids outside of riparian areas.
- If more than 42 gallons of fuel or combined quantity of petroleum product and chemical substances, as project materials, would be transported to a project site, the following precautions will be implemented.

    1. Plan a safe route and material transfer sites so that all spilled material will be contained easily at that designated location.
    2. Plan an active dispatch system that can relay the information to appropriate resources.
    3. Ensure a spill containment kit that can adsorb and contain 55 gallons of petroleum product and chemical substances is readily available.
    4. Provide for immediate notification to Notify Oregon Emergency Response System in the event of a spill. Have a radio-equipped vehicle lead the chemical or fuel truck to the project site.
    5. Assemble a spill notification list that includes the district hazardous materials coordinator, Department of Environmental Quality, and spill clean-up contractors.
    6. Construct a downstream water user contact list with addresses and phone numbers.
    7. When operating within Source Water watersheds, pre-estimate water flow travel times through the watershed to predict downstream arrival times.
    8. Be prepared to sample water and carry sample containers.

  Be prepared to assist Oregon Department of Fish and Wildlife in assessing wildlife impacts of any material spilled.
- Spill Prevention, Control, and Countermeasure Plan: All operators shall develop a modified Spill Prevention, Control, and Countermeasure Plan prior to initiating project work if there is a potential risk of chemical or petroleum spills near water bodies. The Spill Prevention, Control, and Countermeasure Plan will include the appropriate containers to be used and design of the material transfer locations. No interim fuel depot or storage location other than a manned transport vehicle.
- Spill Containment Kit: All operators shall have a Spill Containment Kit as described in the Spill Prevention, Control, and Countermeasure Plan on-site during any operation with potential for run-

off to adjacent water bodies. The Spill Containment Kit will be appropriate in size and type for the oil or hazardous material carried by the operator.

- Operators shall be responsible for the clean-up, removal, and proper disposal of contaminated materials from the site.

Appendix D – Herbicide Effects Analysis

The effect of herbicide application in this analysis is analyzed using GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) - a root zone model that can be used to examine the fate of chemicals in various types of soils under different meteorological and hydrogeological conditions (BLM 2007, pp. B-53 – B-54). This analysis then uses Worksheetmaker to calculate exposure scenarios and risk characterization associated with application of specific herbicides. The model incorporates the specific characteristics including chemical formulation, use rate, and site factors (Worksheetmaker 2006). Worksheetmaker generates Hazard Quotients which assess the likelihood of injury to groups of species under various scenarios. Hazard Quotients are defined as the ratio of the estimated level of exposure to a substance from a specific pesticide application to the reference dose for that substance or to some other index of acceptable exposure or toxicity. This appendix provides additional information about the analysis of effects of herbicide application using GLEAMS and Worksheetmaker.

The following are physical characteristics which may provide deviations from the GLEAMS model. These factors are considered and analyzed recognizing that there is an unknown amount of surrounding uncertainty.

1. The characteristics for the type of clay that is present, imogolite, may not be factored into the model. Montmorillinite factors were assumed to be the closest in similarity due to shrink/swell properties.
2. Soils in the wetlands tend to have pH levels ranging from 4.0 to 7.0 and are considered acid. Soil pH plays a role in the dissociation of anions found in the soil solution, and the nature of the clay may change persistence of the herbicide. The clay has a high anion exchange capacity, the following anions being present in soil solution: chloride, sulphate, fluoride, nitrite and phosphate.
3. The model would not allow for shallow soil. In some areas, there is no alluvial top soil. The clay is at the land surface.
4. Anaerobic conditions of wetlands and characteristics in the clay can alter duration of storage of the herbicide in soil.

The four herbicides modeled in GLEAMS for this analysis have different interactions with soil (Table 31).

Table 31. Herbicide and soil interactions (BLM 2010a; SERA 2007; SERA 2004; SERA 2003a; SERA 2003b; U.S. Forest Service 2011, p. 3.4-11)

Herbicide	Solubility [12] (mg/L)	Soil Adsorption[13] (KOC)	Half-life in anaerobic soil	Half-life in Soil	Effect to Soil Organisms	Summary
Aminopyralid Spot Spray 1 application/yr	Very high	Very low	No information	89-343 days (SERA 2007)	Short-term (1 day), increases in nitrate/mineral, nitrogen observed at concentrations far above typical application rate. Degrades rapidly in sunlit water (photolysis)	Very high soil mobility, long half-life, low risk to aquatic organisms Unknown hazard to soil microorganisms
Clopyralid Spot Spray 1 application/yr	High	Very low	>1000 days	14-29 days (SERA 2004)	No effect on earthworms, or nitrogen fixation, nitrification, and degradation of carbonaceous material- NOEC's far above typical application rates	Very high soil mobility, short half-life, low risk to aquatic organisms Suggested no hazard to soil microorganisms
Glyphosate (aquatic) Broadcast Foliar 2 application/yr	Very high	Very high	12-70 days	30-60 days (SERA 2003a)	Short-term decreases in microbial growth noted in lab study, field studies show short-term increases in microorganisms and microbial activity	Low soil mobility, short half-life, aquatic formulations are low risk to aquatic species Suggested no hazard to soil microorganisms
Triclopyr (TEA) (aquatic) Spot Spray and Hack & Squirt 1 application/yr	High	Low	< 1 day	46 days (SERA 2003b); 30 days (BLM 2010a)	Degradation through microbial metabolism, photolysis and hydrolysis. As plants die can be taken up by other plants	Photodegradable . Resistant to abiotic/biodegradation. Suggested no hazard to soil microorganisms

Table 32 shows total project area (gross acres) where potential herbicide use would be applied by alternative. These estimates represent assumptions made for the purpose of analysis, and are not management objectives or management direction for any alternative. Estimates of gross treatment acres generally overestimate the actual area that would receive herbicide treatment, especially for spot treatments of scattered infestations of target plants.

[12] Solubility: very high 3,000-1,000,000 mg/L; high 300-3,000 mg/L; moderate 30-300 mg/L

[13] Soil Adsorption: high 1,000-3,000 KOC; moderate 100-1,000 KOC; low 36-100 KOC; very low 0-35 KOC

Table 32. Gross acres of herbicide application by alternative

	Prairie Restoration Area	Acres	Natural Maintenance Area/Noxious Weed Control Only	Acres
No Action	None	None	None	None
Alt 1	Yes	1137	Yes	137
Alt 2A	Yes	406	Yes (except Stewart Pond and Eastern Gateway)	765
Alt 2B	Yes	406	Yes (except Stewart Pond and Eastern Gateway)	765
Alt 3A	Yes	279	Yes (except Stewart Pond and Eastern Gateway)	910
Alt 3B	None	None	None	None
Alt 3C	None	None	None	None

GLEAMS runoff results

Herbicides may be transported off-site by percolation or runoff. Exposure from the use of contaminated irrigation water is based on the same data used to estimate human exposure from the consumption of contaminated ambient water. The proportion of the applied amount transported off-site from runoff is presented below. Exposure scenarios are highly variable, dependent on site-specific conditions. The exposure estimates are intended to represent conservative but plausible ranges. Given on-site conditions in the prairie parcels, the concentrations transported off-site from runoff to non-target sites would be extremely low (Table 33).

Table 33. Median application rate of herbicides to non-target site from runoff

herbicide	(pounds/acre)
glyphosate	0.00005
triclopyr	0.000000067
clopyralid	0.0
aminopyralid	0.0

Runoff to non-target sites in the prairie parcels is unlikely to occur, and GLEAMS results support this.

- The prairie wetlands are engineered to store water. Slopes are zero with many ponded areas in the winter (including vernal pools). Berms and recontouring of slopes have limited the connectivity to any waterway.
- There would be targeted spot sprays within larger prairie parcel areas.

- Runoff to streams occurs but very infrequently during winter storm events after the soil has become saturated, generally late December through February.
- When clay is at the surface, it is not easily entrained and tends not to erode.
- Leaching of herbicides into groundwater is unlikely. The massive clay unit has very low transmissivity. Horizontal movement of water through the clay occurs slowly, one inch during an entire wet season. There is one exception along the adjacent Willow Creek parcel where the clays shrink/swelling is deep and piping could occur, delivering sediment into the creek.

Exposure to non-target species on-site could occur within the prairie parcel. As the rains saturate the soils and begin to pond, creating wetlands, if herbicides have persisted in the soil, there is the possibility that adjacent on-site non-target species could be affected. If the herbicide persists in the clay, is soluble and desorbs, it could reconstitute itself as part of the water solution. The herbicide could then cause toxicity to surrounding non-target on-site species.

Worksheetmaker Risk Assessment Analysis Summary

Risk Assessments were used to quantitatively evaluate the probability that an herbicide used in the project area might pose harm to humans, plants and animals. Risk is defined as the likelihood that an effect (injury, disease, death or environmental damage) may result from a specific set of circumstances. It can be expressed in quantitative or qualitative terms. Risks to non-target species associated with herbicide use are often approximated via the use of surrogate species as toxicological data does not exist for most native non-target species. Assessments considered acute and chronic toxicity data and exposure to a "receptor" (fish, plant, mammals, etc.) to direct spray, surface runoff, wind erosion and accidental spill.

Hazard Quotients

Hazard Quotients (HQ) are derived from the Worksheetmaker model and are evaluated under the following scenarios depending on the herbicide considered:

- Summary of Hazard Quotients for Aquatic Species
- Summary of Exposure Assessment and Risk Characterization for Terrestrial Plants from Runoff.
- Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Drift After Backpack Directed Foliar Application.
- Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Drift After Ground Broadcast Foliar Application.
- Potential exposure of non-target plants through the use of contaminated irrigation water based on estimates concentrations in ambient water.
- Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Wind Erosion at the Specified Application

Hazard Quotients are generated to assess risk (likelihood of injury). They are defined as the ratio of the estimated level of exposure to a substance from a specific pesticide application to the reference dose (RfD) for that substance or to some other index of acceptable exposure or toxicity. A Hazard Quotient of 2 or less falls below risk levels. In some assessments, the BLM has used a Hazard Quotient of greater

than 1 to assume risk. See BLM 2010a, pp. 85-104, for a summary of risk. The concentration threshold used to derive risk levels varies by herbicide and groups of species. The relevant concentration is noted in Tables 34, 36, and 39.

Hazard Quotients are presented for different exposure scenarios: lower, central and upper. Upper Hazard Quotients represent an extreme exposure scenario that would be unlikely to occur in a field setting. Hazard Quotients by herbicide are presented for lower, central, and upper exposure scenarios in Tables 34, 36, and 39.

Effects of herbicide application were modeled for triclopyr, clopyralid, glyphosate, and aminopyralid at selected sites within the planning area. Effects on non-target plants from those risk assessments were consistent with BLM 2010a (Table 3-12, pp. 94-99) and the risk assessment for aminopyralid (SERA 2007) and are summarized below. Where Risk Assessments scenarios resulted in moderate or high risk under the BLM EIS (BLM 2007), the BLM generated corresponding Mitigation Measures, Standard Operating Procedures and Conservation Measures which are incorporated here by reference (BLM 2007, Volume 2, pp. 257-468; ROD pp. 3-74). Hazard Quotients that resulted in risks greater than 2 are discussed below and identified in cross-hatched areas. Otherwise, they are noted as "Below HQ (Hazard Quotient) levels".

Glyphosate

Glyphosate is a non-selective systemic herbicide that can damage all groups or families of non-target plants to varying degrees. Glyphosate inhibits the production of aromatic amino acids and certain phenolic compounds. This leads to a variety of toxic effects in plants, including the inhibition of photosynthesis, respiration, and nucleic acid synthesis, thereby resulting in cellular disruption, decreased growth, and death at sufficiently high levels of exposure. Because of its non-selective nature, glyphosate may be highly effective in spot applications or in areas where a variety of invasive species dominate and where very few non-target plants exist. In the planning area, it would potentially be used to reset plant communities that are dominated by invasive species or where groups of non-native/undesirable plants would dominate. Exposure via direct spray would pose a moderate to high risk to plant species that are sensitive to glyphosate and low to moderate risk to tolerant plant species (BLM 2010a, Table 4-13).

Summary of Hazard Quotients for Aquatic Species (Worksheet G03):
Less toxic formulations of glyphosate modeled here are used to control aquatic macrophytes and such applications are likely to damage species of aquatic macrophytes that are sensitive to glyphosate (Table 34) (SERA 2003a, p. 201). Algae appear to be the most sensitive group of non-target aquatic organisms (SERA 2003a, p. 202). The risk assessment indicates that accidental spills pose a moderate risk to aquatic macrophytes. Standard Operating Procedures, label compliance and application by licensed applicators, are all safeguards against accidental acute exposures. Many of the sites within the project area are not adjacent to water and accidental acute exposure to aquatic species would not occur.

Table 34. Glyphosate Hazard Quotients aquatic species – accidental acute exposure (shaded boxes identify Hazard Quotients above the risk level) [14]

Accidental Acute Exposures		HQ Central	HQ Lower	HQ Upper	Concentration used to develop risk level
Fish	Sensitive	**18**	1.5	**73**	NOAEC=0.5
	Tolerant	0.4	<0.1	**1.7**	NOAEC=21
Amphibian	Sensitive	<0.1	<0.1	0.1	NOAEC=340
	Tolerant	<0.1	<0.1	<0.1	NOAEC=470
Invertebrate	Sensitive	**3**	0.3	**13**	NOAEC=2.7
	Tolerant	<0.1	<0.1	0.2	NOAEC=210
Macrophyte	Sensitive	**111**	**9**	**443**	NOAEC=0.082
	Tolerant	<0.1	<0.1	0.2	NOAEC=170
Algae	Sensitive	**39**	**3**	**158**	NOAEC=0.23
	Tolerant	0.2	<0.1	0.6	NOAEC=59

Summary of Exposure Assessment and Risk Characterization for Terrestrial Plants from Runoff (G04): Below HQ levels.

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Drift After Ground Broadcast Foliar Application (Worksheet G05):
The primary hazard to non-target terrestrial plants associated with the application of most herbicides is unintended direct deposition or spray drift. Sensitive species of vegetation will be harmed and probably killed by a direct spray of glyphosate. The risk characterization for drift differs substantially for sensitive and tolerant species (Table 35). For tolerant species, risks associated with drift appear to be minimal as a result of backpack and ground broadcast applications. Typical rates would normally be used in the planning area. At maximum application rates, risks could modestly exceed the level of concern at a distance of 100 feet downwind. At an application rate of 1 pound per acre, risks to sensitive species from drift exceed the level of concern at distance of 100 feet for backpack applications and 500 feet for ground broadcast application. The estimates for off-site drift encompass plausible exposures attributable to wind erosion (SERA 2003a, p. 207). For relatively tolerant species, there is no indication that glyphosate is likely to result in damage at distances as close as 50 feet from the application site (BLM 2010a, Table 4-14). Standard Operating Procedures, label compliance and application by licensed applicators, would be applied to mitigate off-site drift.

[14] The calculation of hazard quotients in this analysis provides much more precise outputs for low hazard quotients than presented in this appendix. Hazard quotients between 0.1 and 0 are presented as <0.1. The exact hazard quotients calculated are available at the BLM Eugene District Office, 3106 Pierce Parkway, Springfield, Oregon.

Table 35. Glyphosate Hazard Quotients from drift (shaded boxes identify Hazard Quotients above the risk level)

Sensitive species	
Drift distance (feet)	**Hazard Quotients** $HQ_{Sens} = ApRt / ToxVal_{Sens}$
0	**1,538**
25	**54**
50	**27**
100	**15**
300	**5**
500	**3**
900	1.7
Tolerant species	
Drift distance (feet)	**Hazard Quotients** $HQ_{Tol} = ApRt / ToxVal_{Tol}$
0	**4**
25	0.2
50	<0.1
100	<0.1
300	<0.1
500	<0.1
900	<0.1

Potential exposure of non-target plants through the use of contaminated irrigation water based on estimates concentrations in ambient water (Worksheet G06a): Below HQ levels.

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Wind Erosion at the Specified Application (Worksheet G06b): Below HQ levels.

Triclopyr

Triclopyr is a selective, systemic herbicide used on broadleaf and woody species. Triclopyr mimics auxin, a plant growth hormone, thus disrupting the normal growth and viability of plants. Commercial formulations include two triclopyr derivatives, triclopyr acid and triclopyr BEE. Triclopyr BEE would not be used in the planning area. Triclopyr acid (TEA) would be used to manage woody species such as ash and cottonwood. In addition, it is effective in riparian areas as a treatment, because it does not damage native grasses and sedges. The BLM application rates modeled in the worksheets were 1.0 pounds acid equivalent per acre (typical rate). Maximum rates would not be used in the planning area. Triclopyr acid has relatively low toxicity. Applications would typically be limited to direct basal applications and hack and squirt applications. Triclopyr has been found to decrease the relative long-term abundance and

diversity of lichens and bryophytes under aerial application, which will not occur in the planning area. Triclopyr was also found to inhibit growth of four types of ectomychorrhizal fungi associated with conifer roots at concentrations of 1,000 parts per million (Estok et al. 1989 *cited in* SERA 2003c).

Summary of Hazard Quotients for Aquatic Species (Worksheet G03):
Aquatic stream plants are at low risk from routine acute exposure to triclopyr acid at the maximum application rate, thus less concern for the typical rate which will be used in the planning area. For longer-term exposures, there is no predicted risk to aquatic plants associated with triclopyr TEA applications, even at the maximum application rate (which would not be used). Accidental spill of triclopyr acid poses a high risk to aquatic macrophytes and algae (Table 36). Standard Operating Procedures, label compliance and application by licensed applicators, are all safeguards against accidental acute exposures. Many of the sites within the project area are not adjacent to water and accidental acute exposure for aquatic species would not occur.

Table 36. Triclopyr Hazard Quotient aquatic species - accidental acute exposure (shaded boxes identify Hazard Quotients above the risk level)

Accidental Acute Exposures		HQ Central	HQ Lower	HQ Upper	Concentration used to develop risk level
Fish	Sensitive	<0.1	<0.1	0.9	NOAEC=20
	Tolerant	<0.1	<0.1	<0.1	NOAEC=210
Amphibian	Sensitive	<0.1	<0.1	0.1	NOEC=125
	Tolerant	<0.1	<0.1	0.1	NOEC=125
Invertebrate	Sensitive	<0.1	<0.1	0.7	NOAEC=25
	Tolerant	<0.1	<0.1	<0.1	NOAEC=320
Macrophyte	Sensitive	**3,634**	**454**	**36,336**	NOEC=0.0005
	Tolerant	0.3	<0.1	**3**	NOEC=5.6
Algae	Sensitive	**8**	1.0	**79**	NOEC=0.23
	Tolerant	0.5	<0.1	**5**	NOEC=4

Summary of Exposure Assessment and Risk Characterization for Terrestrial Plants from Runoff (Worksheet G04): See GLEAMS Model - Results for Application Rate to Non-Target sites (Table 37). However, off-site effects in the project area to non-target plants would not occur because of site conditions, which include ponding and standing winter water that does not leave the site (Table 33).

Table 37. Triclopyr Hazard Quotients from runoff (shaded boxes identify Hazard Quotients above the risk level)

Hazard Quotients		
	Sensitive species	Tolerant species
Central	1.0	<0.1
Lower	<0.1	<0.1
Upper	**4**	<0.1

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Drift After Backpack Directed Foliar Application (Worksheet G05):
The primary hazard to non-target terrestrial plants associated with the application of most herbicides in unintended direct deposition or spray drift. Drift associated with backpack applications is likely to be much less than drift from ground broadcast application. Triclopyr would typically only be applied through directed foliar applications in the project area. AgDrift was used to model estimates in Worksheet 5 for Triclopyr and "actual drift will vary according to a number of conditions" (SERA 2003b, p. 109). Terrestrial non-target sensitive species could be impacted by drift from up to 100 feet (typical rate) (Table 38). Triclopyr TEA can have potentially negative effects on negative mosses and lichens (BLM 2010a, p. 146). Standard Operating Procedures, label compliance, and application by licensed applicators, would be applied to mitigate off-site drift.

Table 38. Triclopyr Hazard Quotients from drift (shaded boxes identify Hazard Quotients above the risk level)

Sensitive species	
Drift distance (feet)	**Hazard Quotients** $HQ_{Sens} = ApRt / ToxVal_{Sens}$
0	**357**
25	**3**
50	1.5
100	0.9
300	0.3
500	0.2
900	0.1
Tolerant species	
Drift distance (feet)	**Hazard Quotients** $HQ_{Tol} = ApRt / ToxVal_{Tol}$
0	0.5
25	<0.1
50	<0.1
100	<0.1
300	<0.1
500	<0.1
900	<0.1

Potential exposure of non-target plants through the use of contaminated irrigation water based on estimates concentrations in ambient water (Worksheet G06a): Below HQ levels.

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Wind Erosion at the Specified Application (Worksheet G06b): Below HQ levels.

Clopyralid

Clopyralid is a selective herbicide most effectively used post-emergence for the control of broadleaf weeds. Clopyralid is a plant growth regulator that is rapidly absorbed across leaf surfaces, and acts as a synthetic auxin hormone, causing a proliferation of abnormal growth that interferes with the transport of nutrients, which can then result in substantial damage to the plant, or death. The BLM application rates were modeled at 0.35 pounds acid equivalent per acre (typical). Clopyralid would be considered for use in the management of several weedy species in the planning area, including knapweeds and thistles.

Summary of Hazard Quotients for Aquatic Species (Worksheet G03):

Clopyralid is relatively non-toxic to aquatic plants. Overall effects to non-target vegetation from normal application of clopyralid are likely to be limited to susceptible plants species in or very near to the treatment area (BLM 2010a, p. 145). Accidental spills may result in temporary growth inhibition of aquatic plants; spills would present a high risk to aquatic macrophytes and a low risk to sensitive algae species (Table 39). Overall, effects to non-target vegetation from normal application of clopyralid are likely to be limited to sensitive plant species in or very near the treatment area. Standard Operating Procedures, label compliance and application by licensed applicators are all safeguards against accidental acute exposures. Many of the sites within the project area are not adjacent to water and accidental acute exposure for aquatic species would not occur.

Table 39. Clopyralid Hazard Quotients aquatic species - accidental acute exposures (shaded boxes identify Hazard Quotients above the risk level)

Accidental Acute Exposures		HQ Central	HQ Lower	HQ Upper	Concentration used to develop risk level
Fish	Sensitive	<0.1	<0.1	0.2	LC50=103
	Tolerant	<0.1	<0.1	<0.1	LC50=1,645
Amphibian	Sensitive	No toxicity data			
	Tolerant	No toxicity data			
Invertebrate	Sensitive	No toxicity data			
	Tolerant	<0.1	<0.1	0.7	NOEC=23.1
Macrophyte	Sensitive	No toxicity data			
	Tolerant	**16**	0.8	**159**	NOEC=0.1
Algae	Sensitive	0.2	<0.1	**2**	EC50=6.9
	Tolerant	<0.1	<0.1	<0.1	EC50=449

Summary of Exposure Assessment and Risk Characterization for Terrestrial Plants from Runoff (Worksheet G04): See GLEAMS model - Results for Application Rate to Non-Target sites (Table 40). However, off-site effects in the project area to non-target plants would not occur because of site conditions, which include ponding and standing winter water that would not leave the site (see Table 33).

Table 40. Clopyralid Hazard Quotients from runoff (shaded boxes identify Hazard Quotients above the risk level)

Hazard Quotients Sensitive Species			
Annual Rainfall (inches)	**Clay**	**Loam**	**Sand**
5	0	0	0
10	0	0	0
15	0.6	0	0
20	1.1	0	0
25	1.5	0	0
50	**3**	<0.1	0
100	**5**	<0.1	0
150	**6**	<0.1	0
200	**7**	<0.1	0
250	**8**	<0.1	0

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Drift After Backpack Directed Foliar Application (Worksheet G05):
The primary hazard to non-target terrestrial plants associated with the application of most herbicides in unintended direct deposition or spray drift. As expected, direct spray of clopyralid poses a high risk to sensitive plant species; direct spray also poses a low risk to tolerant plant species for applications at the maximum application rate (Table 41). However, typical rates would be used in the project area, and applications of clopyralid would typically be done using spot applications. Standard Operating Procedures, label compliance and application by licensed applicators, would be applied to mitigate off-site drift.

Table 41. Clopyralid Hazard Quotients from drift (shaded boxes identify Hazard Quotients above the risk level)

Sensitive species	
Drift distance (feet)	**Hazard Quotients** $HQ_{Sens} = ApRt / ToxVal_{Sens}$
0	**700**
25	**6**
50	**3**
100	1.7
300	0.7
500	0.4
900	0.2

Potential exposure of non-target plants through the use of contaminated irrigation water based on estimates concentrations in ambient water (Worksheet G06a): Below HQ levels.

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Wind Erosion at the Specified Application Rate (Worksheet G06b): Below HQ levels.

Aminopyralid

Aminopyralid is "new" herbicide, and BLM is currently undergoing a risk assessment for this active ingredient. Until or if approval is granted, it would only be applied under the BLM's Research and Demonstration Provision. This active ingredient works selectivity towards broad-leaved plants and could potentially replace clopyralid. In the planning area, it would be used to treat species such as Canada thistle.

Summary of Hazard Quotients for Aquatic Species (Worksheet G03): Below HQ levels.

Summary of Exposure Assessment and Risk Characterization for Terrestrial Plants from Runoff (Worksheet G04): See GLEAMS Model - Results for Application Rate to Non-Target sites (Table 42). However, off-site effects in the project area to non-target plants would not occur because of site conditions which include ponding and standing winter water that does not leave the site (see Table 33).

Table 42. Aminopyralid Hazard Quotients from runoff (shaded boxes identify Hazard Quotients above the risk level)

Hazard Quotients (Sensitive Species)			
Annual Rainfall (inches)	**Clay**	**Loam**	**Sand**
5	0	0	0
10	0	0	0
15	1.9	0	0
20	**3**	0	0
25	**3**	0	0
50	**4**	<0.1	0
100	**5**	<0.1	0
150	**6**	<0.1	0
200	**7**	<0.1	0
250	**8**	<0.1	0
Hazard Quotients (Tolerant Species)			
Annual Rainfall (inches)	**Clay**	**Loam**	**Sand**
5	0	0	0
10	0	0	0
15	<0.1	0	0
20	<0.1	0	0
25	<0.1	0	0
50	<0.1	<0.1	0
100	<0.1	<0.1	0
150	<0.1	<0.1	0
200	<0.1	<0.1	0
250	<0.1	<0.1	0

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Drift After Backpack Directed Foliar Application (G05):

The primary hazard to non-target terrestrial plants associated with the application of most herbicides in unintended direct deposition or spray drift. Direct spray and spray drift up to 25 feet leads to the highest risk quotients for sensitive species (Table 43). Standard Operating Procedures, label compliance and application by licensed applicators, would be applied to mitigate off-site drift.

Table 43. Aminopyralid Hazard Quotients from drift (shaded boxes identify Hazard Quotients above the risk level)

Sensitive species	
Drift distance (feet)	**Hazard Quotients** $HQ_{Sens} = ApRt / ToxVal_{Sens}$
0	**390**
25	**3**
50	1.7
100	0.9
300	0.4
500	0.2
900	0.1
Tolerant species	
Drift distance (feet)	**Hazard Quotients** $HQ_{Tol} = ApRt / ToxVal_{Tol}$
0	0.7
25	<0.1
50	<0.1
100	<0.1
300	<0.1
500	<0.1
900	<0.1

Potential exposure of non-target plants through the use of contaminated irrigation water based on estimates concentrations in ambient water (Worksheet G06a): Below HQ levels

Summary of Exposure Assessment and Risk Characterization for Sensitive and Tolerant Terrestrial Plants from Wind Erosion at the Specified Application (Worksheet G06b): Below HQ levels

Fluazifop – Research and Demonstration

Fluazifop (Fluazifop-P-butyl) would be a "new" herbicide for prairie restoration. The BLM and West Eugene Wetlands partners are seeking a Supplemental label change for this active ingredient for control of non-native grasses. Upon approval of a 24C supplemental label, the BLM would work with qualified researchers and Syngenta to evaluate efficacy of use in prairie restoration. California Department of Agriculture already has issued a 24C Supplemental Label for control of grasses in wildland management.

Appendix E – Standard Operating Procedures for Herbicide Application

The following standard operating procedures have been identified to reduce adverse effects to environmental and human resources from vegetation treatment activities based on guidance in BLM manuals and handbooks, regulations, and standard BLM and industry practices. The list is not all encompassing, but is designed to give an overview of practices that would be considered when designing and implementing a specific vegetation treatment project in the planning area. The following standard operating procedures have been adopted in part from the BLM Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement (BLM 2010). Minor edits have been made to some standard operating procedures for applicability to this RMP and to clarify intent. Additional standard operating procedures have been added relevant to the specific resources present in the planning area. Effects described in the EIS are predicated on the assumption that the standard operating procedures would be applied, or a site-specific determination would be made that the application of a specific standard operating procedure would be unnecessary to achieve their intended purpose or protection.

Like the BMPs in Appendix C, it is not intended that all of the procedures listed would be selected for any specific management action. The overall goal would not be to adhere strictly to a particular set of procedures, but to reduce adverse effects to environmental and human resources when applying herbicides. Although this appendix does not provide an exhaustive list of procedures, the included procedures are believed to cover most herbicide application situations in the planning area. Additional procedures may be identified during the interdisciplinary process when evaluating site-specific management actions and implemented during planned actions. Where found to be ineffective, procedures may require modification to reduce adverse effects to environmental and human resources when applying herbicides. Specialists may consider baseline environmental conditions, type of application, proximity to water, proximity to sensitive resources, disturbance level, direct, indirect, and cumulative effects and timing. They may also evaluate new technology and relevant implementation or effectiveness monitoring data, published studies or other sources of information, in refining existing procedures or recommending new procedures. Review and update of this appendix, including procedure corrections or additions that are derivatives of existing procedures, would be completed through plan maintenance.

Guidance Documents

BLM Handbook H-9011-1 (Chemical Pest Control); and manuals 1112 (Safety), 9011 (Chemical Pest Control), and 9015 (Integrated Weed Management).

General

- Prepare an operational and spill contingency plan in advance of treatment.
- Select the herbicide that is least damaging to the environment while providing the desired results.

• Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, other ingredients, and tank mixtures.
• Apply the least amount of herbicide needed to achieve the desired result.
• Follow herbicide product label for use and storage.
• Review, understand, and conform to the "Environmental Hazards" section on the herbicide product label. This section warns of known herbicide risks to the environment and provides practical ways to avoid harm to organisms or to the environment.
• Minimize the size of application area, when feasible.
• Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/ landowners.
• Adhere to entry restrictions identified on the herbicide product label for public and worker access.
• Post treated areas and specify reentry or rest times.
• Notify the public and adjacent landowners prior to treatment, if appropriate.
• Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location.
• Avoid accidental direct spray and spill conditions to minimize risks to resources.
• Conduct pre-treatment surveys for sensitive habitat and Special Status species within or adjacent to proposed treatment areas.
• Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation.
• Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
• Clean off-highway vehicles to remove plant material, soil, mud and excess oil prior to entering BLM lands.
• Use only vegetable oil based surfactants.

Worker Protection Measures
• Keep a copy of Material Safety Data Sheets at work sites. Material Safety Data Sheets are available for review at http://www.cdms.net/.
• Have licensed or certified applicators or State-licensed "trainees" apply herbicides, or have BLM employees apply herbicides under the direct supervision of a BLM-certified applicator.
• Have all BLM employees applying herbicides wear appropriate protective clothing. At a minimum, use the type and amount of protective clothing listed on the herbicide label.
• Develop a Job Hazard Analysis for BLM employees involved in herbicide applications, providing a detailed description of the jobs and associated risks involved with herbicide use and application. Identify requirements for personal safety equipment, training, and certification to perform specific tasks.
• Conduct herbicide applications done by BLM employees in compliance with all aspects of EPA's Worker Protection Standard under the Federal Insecticide, Fungicide, and Rodenticide Act, including protection during applications, restricted entry intervals, personal protective equipment, notification of workers, decontamination supplies, emergency assistance, herbicide safety training and safety posters, and access to labeling and site-specific information.

Air Quality

See Manual 7000 (Soil, Water, and Air Management)

• Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks.

• Apply herbicides in favorable weather conditions to minimize drift. For example, treat when winds are between 2 and 10 miles per hour. Do not apply herbicides if rainfall is imminent, or if snow or ice is on the ground.

• Use drift reduction agents, as appropriate, to reduce the drift hazard.

• Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]).

• Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).

Soil

See Manual 7000 (Soil, Water, and Air Management)

• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected.

Water Resources

See Manual 7000 (Soil, Water, and Air Management)

• Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body.

• Do not rinse spray tanks in or near water bodies.

• Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 25 feet for vehicle (boom or broadcast type sprayers), and 10 feet for hand spray applications.

Fish and Other Aquatic Organisms

See manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans)

• Use appropriate buffer zones based on label and risk assessment guidance.

• Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast treatments.

• Use appropriate application equipment/method near water bodies if the potential for off-site drift exists.

• Establish appropriate herbicide-specific buffer zones for water bodies, habitats, or fish or other aquatic species of interest, and recommendations in individual ecological risk assessment.

• To protect Special Status fish and other aquatic organisms, implement all conservation measures for aquatic animals presented in the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment (see BLM 2010a, Appendix 5).

Wildlife

See manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans)

• Use herbicides of low toxicity to wildlife, where feasible.
• Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area.
• Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
• To minimize risks to terrestrial wildlife, do not exceed the typical application rate for applications of glyphosate or triclopyr, where feasible.
• To protect Special Status wildlife species, implement conservation measures for terrestrial animals presented in the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment (See BLM 2010a, Appendix 5).

Threatened and Endangered Species
See manual 6840 (Special Status Species)
• Herbicide treatments that are implemented when listed plants are growing and Fender's blue butterfly are active (i.e., in the spring) will be done in a manner that minimizes effects to listed species by using targeted application methods (e.g., wick application or spot spray), distance buffers and/or baffling systems to minimize the risk of listed species coming into contact with herbicides.
• Glyphosate (by broadcast or spot-spray) and triclopyr, clopyralid, or aminopyralid (by spot-spray or direct basal application) could be applied any time outside of patches of listed plants as long as application is within label.
• Within patches of listed plants, application of glyphosate, triclopyr, clopyralid, or aminopyralid would generally be done in fall when listed plants are dormant. Occasional within-patch treatments could occur anytime, but listed plants would be protected by distance or baffling systems.
• Invasive woody species within Kincaid's lupine patches could be treated with triclopyr (spot-spray or direct basal application) in the fall with no contact with listed plant species.
• Fluazifop could be broadcast using boom sprayers or handguns mounted on tractors or all-terrain vehicles, applied by workers on foot with backpack sprayers, or spot applied to manage competitive grasses.
• Fluazifop could be applied in spring or fall (approximately 3 weeks after burning) when target plants are actively growing within or outside of patches of listed plants.

Cultural Resources and Paleontological Resources
See handbooks H-8120-1 (Guidelines for Conducting Tribal Consultation) and H- 8270-1 (General Procedural Guidance for Paleontological Resource Management), and manuals 8100 (The Foundations for Managing Cultural Resources), 8120 (Tribal Consultation Under Cultural Resource Authorities), and 8270 (Paleontological Resource Management). See also: Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act.
• Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the Programmatic Agreement among the Bureau of Land Management, the

Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act and State protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested tribes.

• Follow BLM Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts.

• Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments; work with tribes to minimize impacts to these resources.

• Follow guidance under Human Health and Safety in BLM 2010a in areas that may be visited by Native peoples after treatments.

Visual Resources

See handbooks H-8410-1 (Visual Resource Inventory) and H-8431-1 (Visual Resource Contrast Rating), and manual 8400 (Visual Resource Management)

• Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation.

• Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area.

• Lessen visual impacts by designing projects to blend in with topographic forms and revegetating the site following treatment.

• When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established Visual Resource Management objectives.

Recreation

See Handbook H-1601-1 (Land Use Planning Handbook, Appendix C)

• Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species.

• Mitigation measures that may apply to recreational resources are associated with human and ecological health (see mitigation measures for Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, and Human Health and Safety).

Social and Economic Values

• Notify local emergency personnel of proposed treatments.

• To the degree possible within the law, hire local contractors and workers to assist with herbicide application projects and purchase materials and supplies for herbicide treatment projects (including the herbicides) through local suppliers.

• Provide public educational information on the need for vegetation treatments and the use of herbicides in an integrated vegetation management program for projects proposing local use of herbicides.

Rights-of-way

• Coordinate vegetation treatment activities where joint or multiple use of a right-of-way exists.
• Notify other public land users within or adjacent to the right-of-way proposed for treatment.
• Use only herbicides that are approved for use in right-of-way areas.

Human Health and Safety

• Establish a buffer between treatment areas and human residences based on guidance given in the human health risk assessment, with a minimum buffer of 100 feet for ground applications, unless a written waiver is granted.
• Provide public notification in newspapers or other media where the potential exists for public exposure.
• Store herbicides in secure, herbicide-approved storage.
• Notify local emergency personnel of proposed treatments.
• Contain and clean up spills and request help as needed.
• Secure containers during transport.
• Dispose of unwanted herbicides promptly and correctly.
• Use the typical application rate, where feasible, when applying triclopyr to reduce risk to workers and the public.

Table 44 describes potential adverse effects of herbicide use and standard operating procedures that would minimize or avoid the adverse effect. This is not a complete list of either the potential adverse effects of herbicide use or relevant standard operating procedures; this list highlights the most directly related standard operating procedures. Most of the potential effects identified in Table 44 are not reasonably foreseeable. The identified potential effects are possible, but highly unlikely, as described in Chapter 4. The relevant standard operating procedures act to even further reduce the likelihood of or entirely avoid an effect that is already highly unlikely.

Table 44. Potential effects of herbicide use and standard operating procedures to minimize or avoid effects

Potential effect	Standard Operating Procedures to minimize or avoid adverse effect
Drift of herbicides	• Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/ landowners. • Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks. • Apply herbicides in favorable weather conditions to minimize drift. For example, treat when winds are between 2 and 10 miles per hour. Do not apply herbicides if rainfall is imminent, or if snow or ice is on the ground. • Use drift reduction agents, as appropriate, to reduce the drift hazard. • Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]). • Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).
Runoff of herbicides to water	• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected. • Do not rinse spray tanks in or near water bodies. • Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 25 feet for vehicle (boom or broadcast type sprayers), and 10 feet for hand spray applications.
Spill of herbicides in water	• Prepare an operational and spill contingency plan in advance of treatment. • Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body. • Do not rinse spray tanks in or near water bodies. • Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 25 feet for vehicle (boom or broadcast type sprayers), and 10 feet for hand spray applications. • Store herbicides in secure, herbicide-approved storage. • Secure containers during transport.
Exposure to public	• Adhere to entry restrictions identified on the herbicide product label for public and worker access. • Post treated areas and specify reentry or rest times. • Notify the public and adjacent landowners prior to treatment, if appropriate. • Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species. • Establish a buffer between treatment areas and human residences based on guidance given in the human health risk assessment, with a minimum buffer of 100 feet for ground applications, unless a written waiver is granted. • Provide public notification in newspapers or other media where the potential exists for public exposure.
Exposure to workers	• Adhere to entry restrictions identified on the herbicide product label for public and worker access. • Have licensed or certified applicators or State-licensed “trainees” apply herbicides, or have BLM employees apply herbicides under the direct

Potential effect	Standard Operating Procedures to minimize or avoid adverse effect
	supervision of a BLM-certified applicator. • Have all BLM employees applying herbicides wear appropriate protective clothing. At a minimum, use the type and amount of protective clothing listed on the herbicide label. • Develop a Job Hazard Analysis for BLM employees involved in herbicide applications, providing a detailed description of the jobs and associated risks involved with herbicide use and application. Identify requirements for personal safety equipment, training, and certification to perform specific tasks. • Conduct herbicide applications done by BLM employees in compliance with all aspects of EPA's Worker Protection Standard under the Federal Insecticide, Fungicide, and Rodenticide Act, including protection during applications, restricted entry intervals, personal protective equipment, notification of workers, decontamination supplies, emergency assistance, herbicide safety training and safety posters, and access to labeling and site-specific information.
Exposure to non-target vegetation	• Conduct pre-treatment surveys for sensitive habitat and Special Status species within or adjacent to proposed treatment areas. • Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation. • Apply the least amount of herbicide needed to achieve the desired result.
Exposure to threatened or endangered species	• Conduct pre-treatment surveys for sensitive habitat and Special Status species within or adjacent to proposed treatment areas. • Herbicide treatments that are implemented when listed plants are growing and Fender's blue butterfly are active (i.e., in the spring) will be done in a manner that minimizes effects to listed species by using targeted application methods (e.g., wick application or spot spray), distance buffers and/or baffling systems to minimize the risk of listed species coming into contact with herbicides. • Glyphosate (by broadcast or spot-spray) and triclopyr, clopyralid, or aminopyralid (by spot-spray or direct basal application) could be applied any time outside of patches of listed plants as long as application is within label. • Within patch of listed plants, application of glyphosate, triclopyr, clopyralid, or aminopyralid would generally be done in fall when listed plants are dormant. Occasional within-patch treatments could occur anytime, but listed plants would be protected by distance or baffling systems. • Invasive woody species within Kincaid's lupine patches could be treated with triclopyr (spot-spray or direct basal application) in the fall with no contact with listed plant species. • Fluazifop could be broadcast using boom sprayers or handguns mounted on tractors or all-terrain vehicles, applied by workers on foot with backpack sprayers, or spot applied to manage competitive grasses. • Fluazifop could be applied in spring or fall (approximately 3 weeks after burning) when target plants are actively growing within or outside of patches of listed plants.
Exposure to terrestrial animals	• Conduct pre-treatment surveys for sensitive habitat and Special Status species within or adjacent to proposed treatment areas. • Use spot applications or low-boom broadcast operations where possible to

Potential effect	Standard Operating Procedures to minimize or avoid adverse effect
	limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area. • Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
Exposure to aquatic animals	• Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast treatments. • Use appropriate application equipment/method near water bodies if the potential for off-site drift exists. • Establish appropriate herbicide-specific buffer zones for water bodies, habitats, or fish or other aquatic species of interest, and recommendations in individual ecological risk assessment.

Appendix F – Travel and Transportation Management

The final travel and transportation management network for the planning area will be defined concurrently with and as part of the West Eugene Wetlands RMP process.

As described in Chapter 2, the entire planning area would be managed as a single Travel Management Area.

The following criteria for travel and transportation designations have been used based on the protection of the resources of the public lands, the promotion of the safety of all the users of the public lands, and the minimization of conflicts among various uses of the public lands, consistent with 43 CFR 8342:

- Areas and trails shall be located to minimize damage to soil, watershed, vegetation, air, or other resources of the public lands, and to prevent impairment of wilderness suitability.
- Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats. Special attention will be given to protect endangered or threatened species and their habitats.
- Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors. Areas and trails shall be located in natural areas only if the authorized officer determines that off-road vehicle use in such locations will not adversely affect their natural, esthetic, scenic, or other values for which such areas are established.
- The Prairie Restoration Area has a management objective to restore and maintain habitat for prairie-related species. Areas and trails would be located within the Prairie Restoration Area only if they would not adversely affect the restoration and maintenance of habitat for prairie-related species.
- The Natural Maintenance Area has a management objective to maintain existing plant and animal habitat and provide opportunities for a variety of goods and services. Areas and trails would be located within the Natural Maintenance Area only if they would not adversely affect the maintenance of existing plant and animal habitat.

As described in Chapter 3, the planning area is characterized by upland and wet prairies and oak woodland and savanna habitats, with finer scale features, such as vernal pools, emergent wetlands and ash swales. Four listed species are present in the planning area: Willamette daisy, Bradshaw's lomatium, Kincaid's lupine, and Fender's blue butterfly. The planning area is thought to be within the historical range of another listed species, golden paintbrush, but there are no current populations in the planning area. Approximately one-third of the planning area is designated critical habitat for threatened and endangered species. The Recovery Plan identified off-road vehicle use, hikers, cyclists, and horses as threats to the listed species (USFWS 2010, p. III-4). The U.S. Fish and Wildlife Service and the Benton County Habitat Conservation Plan identify off-highway vehicles and trails as adversely affecting listed prairie species (USFWS 2011b, p. B-16; Benton County 2010, p. 104).

In 2005, the BLM published in the Federal Register supplementary rules for public use of the planning area. The supplemental rules address issues of conduct for such things as occupancy, motor vehicle use, firearms and campfires in order to protect the area's natural resources and provide for public health and safety (Final Supplementary Rules for Public Land within the West Eugene Wetlands, Eugene District, OR, 70 Fed. Reg. 43713-43715 (2005). The supplemental rules prohibited the use or operation of motorized vehicles on the Fern Ridge Path, or the operation of motorized or nonmotorized vehicles off those roads or paths or parking areas specifically designated for vehicle use.

Most of the planning area is in small parcels of BLM-administered lands adjacent to private lands with poorly marked or unmarked property boundaries. Any off-road vehicle use on the BLM-administered lands would be likely to lead to effects on adjacent private lands. In addition, areas on BLM-administered lands allocated to the Prairie Restoration Area and the Natural Maintenance Area would be in small parcels in close proximity without a marked boundary. It would not be possible to allow off-road vehicle use in the Natural Maintenance Area without effects to the Prairie Restoration Area.

Under all action alternatives, all of the planning area would be designated as Limited to Designated Roads for off-highway vehicle use. Consistent with 43 CFR 8340.0-5(g), Limited area means an area restricted at certain times, in certain areas, and/or to certain vehicular use. These restrictions may be of any type, but can generally be accommodated within the following type of categories: numbers of vehicles; types of vehicles; time or season of vehicle use; permitted or licensed use only; use on existing roads and trails; use on designated roads and trails; and other restrictions.

Three types of routes are designated in the planning area: motorized, mechanized, and pedestrian. Motorized routes would be available for pedestrian use, mechanized use (such as bicycles), and motorized use by street legal vehicles. Mechanized routes would be available for pedestrian use and mechanized use (such as bicycles) only. Pedestrian routes would be available for pedestrian use only. Designated routes are identified in Map 16 and Table 45. Altogether, the length of the mechanized, mechanical, and pedestrian routes totals approximately 4.4 miles and covers a total of approximately 5.3 acres. This represents less than 1% of the planning area.

The designated roads available for motorized vehicle use would be as follows:

- the parking area at the Stewart Pond site off of Stewart Road, and
- the paved entrance road and gravel parking lot at the Danebo site off of South Danebo Avenue.

Motorized use on these designated roads would be limited to use by street legal vehicles. Map 16 shows the designated roads available for motorized vehicle use. These roads would also be available for non-motorized vehicle use. The length of these motorized routes totals less than 0.1 mile and covers a total of approximately 0.7 acres. This represents less than 1% of the planning area. The travel and transportation objective for these designated roads that are available for motorized vehicle use would be to provide access to public lands in the planning area. In addition, city and county roads provide access to the public lands in the planning area. City and county roads do not actually cross BLM-administered lands, but are nearby or border many BLM-administered parcels in the planning area,

including areas in which the property boundaries are not evident. This RMP would not limit or restrict any use of city or county roads.

Motorized vehicle use on any other roads within the planning area would be prohibited. Motor vehicles being used by duly authorized emergency response personnel, including police, ambulance and fire suppression, as well as BLM or BLM-authorized vehicles being used for official duties, are excepted.

The mechanized routes in the planning area are limited to one trail in the planning area, the Fern Ridge Path, which is identified on Map 16. The Fern Ridge Path would be limited to pedestrian and non-motorized vehicle use. No motorized use or equestrian use would be allowed on the Fern Ridge Path. Mechanized use (i.e., non-motorized vehicle use) would be restricted to the designated roads identified above for motorized use and the Fern Ridge Path, consistent with the 2005 supplemental rules. The length of the mechanized routes totals approximately 1.9 miles and covers a total of approximately 2.8 acres. This represents less than 1% of the planning area. The travel and transportation objective for the Fern Ridge Path would be to provide pedestrian and non-motorized vehicle recreation opportunities.

The pedestrian routes in the planning area are other trails identified on Map 16, include the existing Tsanchiifin Walk at Balboa and existing trails at Danebo, Stewart Pond, and Eastern Gateway. These trails would be limited to pedestrian use only. No motorized or mechanical use would be allowed on these trails. No equestrian use would be allowed on these trails. The length of these pedestrian routes totals approximately 2.9 miles and covers a total of approximately 1.8 acres. This represents less than 1% of the planning area. The travel and transportation objective for these trails would be to provide access to public lands in the planning area and provide pedestrian recreation opportunities.

Table 45 Mileage and area of designated routes

	Routes	**Length (miles)**	**Area (acres)**
Motorized	Stewart Pond parking area	<0.1	0.1
	Danebo entrance and parking area	<0.1	0.6
Mechanized	Fern Ridge Path	1.9	2.8
Pedestrian	Balboa trail (Tsanchiifin Walk)	0.6	0.4
	Danebo trails	0.2	0.1
	Stewart Pond trails	1.6	1.2
	Eastern Gateway trail	0.1	0.1
total		4.4	5.3

Minor modifications of the road and trail network during RMP implementation are allowed as RMP maintenance. Consistent with 43 CFR 1610.5-4, minor modifications of the road and trail network would constitute minor changes in data. Such RMP maintenance is limited to further refining or documenting a

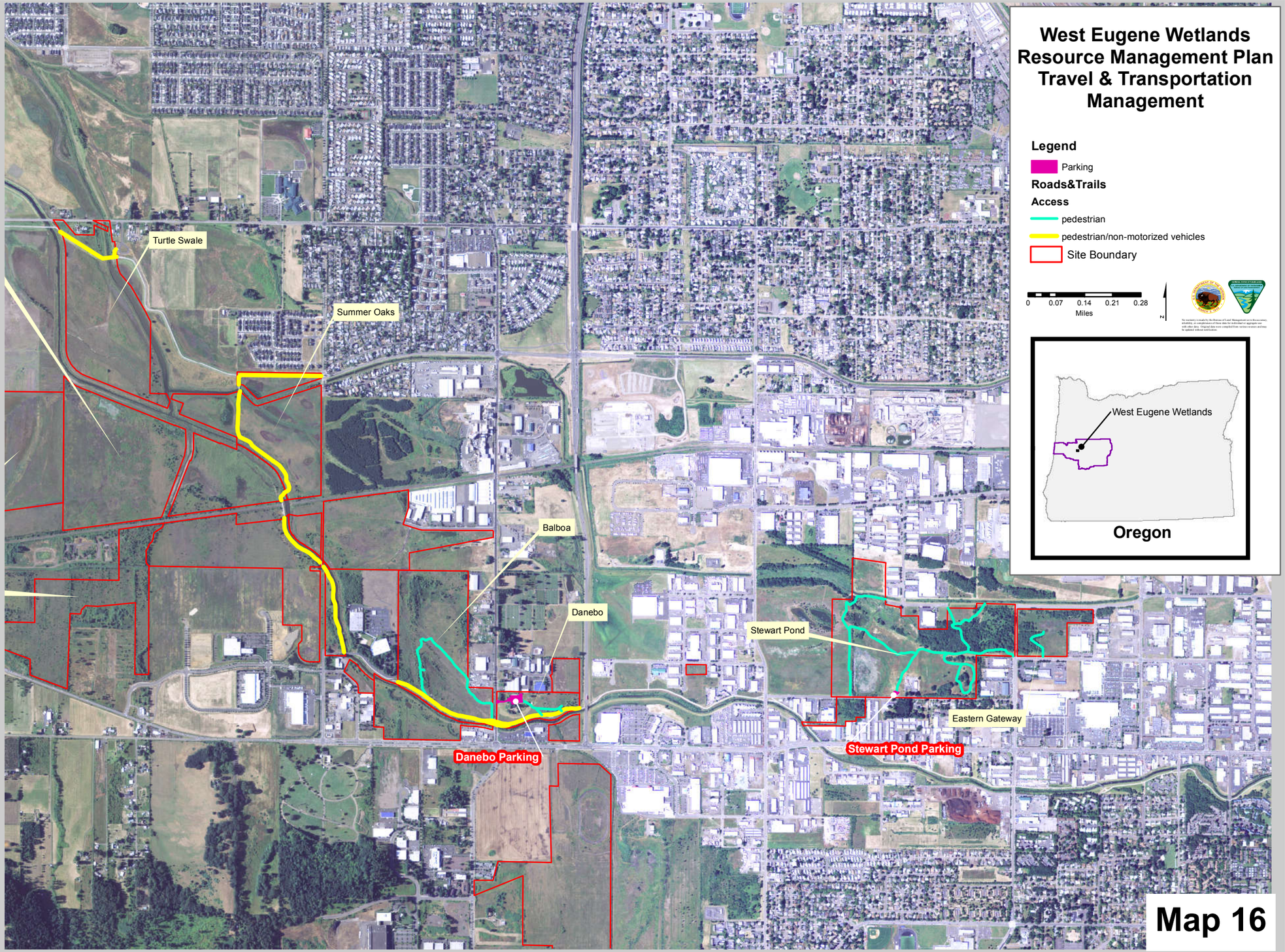
previously approved decision incorporated in the plan. RMP maintenance shall not result in expansion in the scope of resource uses or restrictions, or change the terms, conditions, and decisions of the approved plan. Maintenance is not considered a RMP amendment and shall not require the preparation of an environmental assessment or environmental impact statement. In this context, minor modifications would be realignments of less than one-quarter mile of a road or trail. Such minor modifications would not include the construction of a new road or trail, unrelated to one of the roads designated for motorized vehicle use or designated trails.

Rehabilitation of unauthorized trails in the planning area would include the following measures:

- Removal of debris and trash;
- Stabilization or decompaction of disturbed soil as needed;
- Use certified weed-free native straw mulch or geo-textiles to minimize erosion and prevent the introduction of undesirable weeds as needed;
- Seeding or planting with native plant material;
- Fencing the area or providing other physical barriers as needed and likely to be effective to avoid future unauthorized trails.

No easements and rights-of-ways (to be issued to the BLM or others) are needed to maintain the existing road and trail network providing public land access in the planning area.

West Eugene Wetlands Resource Management Plan Travel & Transportation Management



Map 16

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Eugene District Office
P.O. Box 10226
Eugene, Oregon 97440