The Bendire Complex Fire Emergency Stabilization and Rehabilitation Invasive Plant Management Plan

ENVIRONMENTAL ASSESSMENT
DOI-BLM-ORWA-V000-2016-0027-EA

Bureau of Land Management

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Bendire Complex
Emergency Stabilization and Burned Area Rehabilitation (ESR) Invasive Plant Management Plan
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CHAPTER I: PURPOSE AND NEED FOR ACTION

Introduction

The Vale District Bureau of Land Management (BLM) is proposing to implement emergency stabilization and burned area rehabilitation (ESR) actions on the Bendire Complex (J1A5) burned area located in the northwest corner of the Malheur Resource Area (See Map 1). Stabilization and rehabilitation actions analyzed in this Environmental Assessment (EA) would include treatments of noxious weeds and invasive annual grasses on key portions of the Bendire Complex burned area. For the purpose of this document, the term "invasive annual grasses" will include the two noxious-listed species, Medusahead and ventenata, as well as cheatgrass. This EA discusses and analyzes the alternatives to treat these invasive species.

A separate emergency stabilization and rehabilitation plan was prepared for the Bendire Complex Fire (J1A5) which addresses ESR actions other than the treatment of noxious weeds and invasive annual grasses.

The Bendire Complex was ignited by lightning on Monday, August 10, 2015. The fire began as two small fires, Pole Gulch (450 acres) and Bully Creek (45 acres). On Tuesday, August 11, 2015, the fires totaled 15,000 acres and became the Bendire Complex and on August 12, 2015, the fires grew together forming one fire. Weather at the time of ignition was hot and dry with temperatures in the area from the mid-80s to 100-degrees Fahrenheit since August 1, 2015 with no measureable precipitation over the month prior. The burn area consists of soils typical of grass-shrub semiarid rangelands Aridisols, Mollisols and Entisols (USDI 2010 pg 174-188). Soils within the burned area are susceptible to wind erosion in the short term until vegetation cover returns. Those soils with a higher rock component are more resistant to both wind and water erosion. All soil types are susceptible to water erosion during heavy precipitation and spring run-off events, specifically in areas where flow is concentrated due to topographic features.

Elevations within the fire range from 4000ft to 5400+ft and with precipitation ranging between 10" - 16" annually depending on elevation, slope and aspect. The burned area was comprised mainly of both Wyoming big sage brush (*Atremisia tridentata* ssp. *wyomingensis*) and basin big sage brush (*A. tridentata* ssp. *tridentata*) with understories of both deep rooted perennial grasses (Bluebunch wheatgrass/Idaho fescue) and invasive annual grasses. To a lesser extent within the burn area were pockets of scrubland sagebrush (*Atremisia rigida*) which held very little herbaceous understory. Generally speaking, the islands of unburned vegetation were the islands of scrubland sagebrush which grow in low density (plant/acre) and lack the fine fuels necessary to carry a fire.

High-elevation sagebrush/bunchgrass communities: High elevation sagebrush acreages are dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Mountain big sagebrush occurs on sites that are more productive than Wyoming big sagebrush sites. Soils are often deep and well drained on mountain slopes. Plant diversity and productivity is greater than on Wyoming big sagebrush sites. Herbaceous plant composition is similar to other sagebrush types, but mountain big sagebrush plant communities tend to have a higher density and cover of large perennial grasses and deep-rooted perennial forbs. Idaho fescue and bluebunch wheatgrass are often found as soil depth and elevation increase. Gray rabbitbrush (*Ericameria nauseosa*), wax currant (*Ribes cereum*), antelope bitterbrush (*Purshia tridentata*), and mountain snowberry (*Symphoricarpos oreophilus*) are commonly found in association with mountain big sagebrush. Mountain big sagebrush plant communities have a greater grass and forb component than the drier Wyoming big sagebrush plant communities. Portions of the high-elevation sagebrush/bunchgrass acreages have burned in large wildfires within the past 2 decades. This allowed for invasion of noxious weeds and invasive annual grasses.

Low-elevation sagebrush/bunchgrass communities: Low elevation sagebrush acreages are dominated by Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and low sagebrush (*A. arbuscula*). Low sagebrush most often is found on shallow soils with either a restrictive layer or bedrock within 12 inches of the soil surface. Low sagebrush sites tend to be low to moderately productive because of shallow soils. Low sagebrush occupies slightly lower productivity sites with shallower soils with more rock on the surface. Herbaceous species found in association with low sagebrush includes bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), Thurber's needlegrass (*Achnatherum thurberianum*), bottlebrush squirreltail (*Elymus elymoides*), and Sandberg's bluegrass (*Poa secunda*). Forbs commonly found on the site include arrowleaf balsamroot (*Balsamorhiza sagittata*), taper tip hawksbeard (*Crepis acuminata*), false dandelion (*Agoseris glauca*), prairie lupine (*Lupinus lepidus*), Hood's phlox (*Phlox hoodii*), low pussytoes (*Antennaria dimorpha*), and cushion buckwheat (*Eriogonum ovalifolium*).

Other invasive species in and near the burned area: Within and adjacent to the burned area there are numerous small sites of yellow starthistle (*Centaurea solstitialis*), Russian knapweed (*Acroptilon repens*), spotted knapweed (*Centaurea stoebe*), diffuse knapweed (*Centaurea diffusa*), perennial pepperweed (*Lepidium latifolium*), whitetop species (*Lepidium* ssp), Scotch thistle (*Onopordum acanthium*), bull thistle (*Circium vulgare),* and Canada thistle (*Circium arvense*). Larger populations of ventenata (*Ventenata dubia*) and several thousand acres of Medusahead (*Taeniatherum medusae*) are also known to be within the fire vicinity. Dalmatian toadflax (*Linaria dalmatica*) and Mediterranean sage (*Salvia aethiopis*) are near Beulah Reservoir, two to five miles, respectively, from the fire boundary, and could potentially be within the burned area.

The fire area is currently occupied Greater Sage-Grouse habitat and the entire area burned (49,628 acres, BLM and PVT) is designated as within a Priority Habitat Management Area (PHMA) for sage-grouse. Ten sage-grouse leks are present within the burn perimeter; seven active, three historic/unoccupied. The entire burn area is also within the Northern Great Basin Priority Area of Conservation (PAC) for sage-grouse and within the Beulah Fire and Invasive

Assessment Tool (FIAT)[1] project planning area (PPA). The 702,900-acre Beulah PPA (Project Planning Area) is in Malheur and Baker Counties in eastern Oregon; the entire PPA is within the BLM Vale District. Landownership in the Beulah PPA is approximately 60 percent BLM, 39 percent private, and 1 percent state- administered lands.

Portions of the fire burned through the historic Vale Project. The Vale Project marked a significant departure for BLM's range program— resulting in a shift away from mostly managing livestock numbers, to managing the range itself. In addition to implementing new grazing systems, brush control and water developments, the BLM experimented with the introduction of non-native grasses and the use of herbicides to improve rangeland. Lands were also exchanged to create better management units.

Various aquatic and riparian resources were affected by the Bendire Complex fires. There are 230 acres of BLM aquatic resources, 8.2 miles of perennial, and 155.9 miles of intermittent streams within the analysis area. Murphy Reservoir (30 surface acres) and the fisheries in the reservoir may be affected by ash and debris flows from an intense runoff event, either from rainfall and/or snow melt.

Purpose and Need for Action

The Purpose

The purpose of the actions is to stabilize, rehabilitate and protect the area burned by the Bendire Complex fires by the following means:

Enhance and protect Greater Sage-Grouse habitat by increasing the resilience of sagebrush habitat to future disturbance and increasing resistance of habitat to invasive annual grass (Chambers et. al 2014).

Cooperatively control invasive plants so they do not infest or re-infest adjacent non-BLM-administered lands.

Prevent control treatments from having unacceptable adverse effects to applicators and the public, to desirable flora and fauna, and to soil, air, and water.

Minimize treatment costs and improve treatment effectiveness, so resource damage and economic losses from invasive plants are reduced and more of the Need can be met within expected funding.

Encourage recovery of native vegetation within the burned area through noxious and invasive annual grass treatments of known and discovered populations.

[1] Fire and Invasive Assessment Tool (FIAT): Assessments used to develop collaborative implementation plans addressing threats to sage-grouse resulting from invasive annual grasses, wildfires, and conifer expansion within Priority Areas for Conservation (PACs). FIAT requires a risk-based approach to prioritize investment in fuels treatments, fire suppression capability, post-fire stabilization, rehabilitation and restoration on sagebrush habitat within the Great Basin.

Stabilize and rehabilitate soils vulnerable to erosion and ecological communities susceptible to invasion by non-native species.

The Need

Many species of noxious and invasive plants are known to occupy the Bendire Complex burned area, with individual locations ranging from a few plants to larger areas infested by medusahead rye and other invasive annual grasses. Unmapped noxious weeds are also known to be present on adjacent private, State and other BLM-administered lands and are an added threat to invade the burned area. In spite of the efforts of the existing noxious weed program, noxious weeds are continuing to spread at an estimated rate of 12 percent per year (USDI 2010:133).[2] Adverse effects are loss or degradation of ecosystem function including displacement of native vegetation; reduction in habitat and forage for wildlife and livestock; loss of federally listed and other Special Status species' habitat; increased soil erosion; reduced water quality; reduced soil productivity; reduced wilderness and recreation values; and, changes in the intensity and frequency of fires (USDI 2010:7).

For some invasive annual grasses and noxious plant species such as medusahead rye and perennial pepperweed (*Lepidium latifolium*), neither non-herbicide methods nor the four herbicides currently utilized result in effective control (USDI 2010:6, 588, 618-19). The existing program also does not have an effective method for selectively controlling other invasive annual grasses such as cheatgrass (*Bromus tectorum*) or North Africa grass (*Ventenata dubia*) that are primary invaders following wildfires. Without effective controls, these invasive annual grass infestations would continue to increase in size and density, displacing native vegetation, preventing wildlife habitat rehabilitation, degrading Greater sage-grouse habitat, and increasing the risk of wildland fire. Uncontrolled, ventenata has the ability to invade and dominate sodded areas of small, moist meadows near springs or seeps that are critical sage-grouse brood rearing habitat.

Newer, more selective herbicides are now available to treat invasive plants. These herbicides can be used in lower quantities, and they pose less environmental and human health safety risk than the four herbicides currently being utilized (USDI 2010:80 and others). In addition, if these additional herbicides were available, invasive plant treatment efficacy would improve from an estimated 60 percent to 80 percent (USDI 2010:136).

Invasive plants may also spread to adjacent non-BLM-administered lands, increasing control costs for affected landowners and degrading land values. The BLM participates in cooperative public/private invasive plant control efforts such as the BLM OR-Malheur County Noxious Weed Partnership. However, the BLM's current inability to use herbicides commonly used by cooperators on adjacent lands results in less effective control and/or coordination difficulties.

[2] See also the rate of spread discussion in the *Invasive Plants* section early in Chapter 3.

Executive Order 13112 (February 1999) requires Federal agencies to "(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; [and] (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded…" In addition, section 302(b) of the *Federal Land Policy and Management Act* of 1976 directs BLM to "take any action necessary to prevent unnecessary or undue degradation of the lands" (43 U.S.C. 1732(b)(2)).

Secretarial Order 3336 Rangeland Fire Prevention, Management, and Restoration (January 2015) sets forth policies and strategies for preventing and suppressing wildland fire and for restoring sagebrush landscapes impacted by fire across the West. These actions are essential for conserving habitat for the greater sage-grouse as well as other wildlife species and economic activity, such as ranching and recreation, associated with the sagebrush-steppe ecosystem in the Great Basin region. The SO3336 directs Department of Interior agencies to "Seek to reduce the likelihood, size, and severity of rangeland fires by addressing the spread of cheatgrass and other non-native invasive species." in section 5 (b).

Federal Register notice dated October 2, 2015, the US Fish and Wildlife Service determined that the listing of the greater sage-grouse is "not warranted at this time" (80 FR 191, p 59858-59942). The decision was based on the determination that "the primary threats to greater sage-grouse have been ameliorated by conservation efforts implemented by Federal, State and private landowners. A substantial number of acres of Greater Sage-Grouse habitat were impacted by the Bendire Complex fires (Map 3). There is a need to stabilize habitat, rehabilitate the biological integrity of the sagebrush ecosystem, limit the expansion or dominance of invasive species and accelerate the recovery of native vegetation critical for sage-grouse habitat.

The *Oregon Greater Sage-Grouse Proposed Resource Management Plan Amendment* (RMPA) *and Final Environmental Impact Statement* (FEIS, June, 2015) and subsequent *Record of Decision (ROD) and Approved Resource Management Plan Amendments (ARMPA) for the Great Basin Region, Including the Greater Sage-Grouse Oregon Sub-Region* (September 2015) considered the threats to Sage-Grouse and their habitat and incorporated protection and restoration management direction to address these threats. Non-native and invasive plant species were identified by the US Fish and Wildlife Service (75 FR 55, p 13910, March 23, 2010) as a primary threat within the Great Basin to the species. Key management responses were to: a) improve sage-grouse habitat by treating annual grasses and b) treat sites in PHMA and GHMA that contain invasive species infestation through an integrated pest management approach (p.I-19 from ARMPA ROD). 100% of the Bendire Complex burned area is designated in the ROD as within Priority Habitat Management Area.

There is also a need to:

- Minimize threats to life or property (rangeland and related range improvements; safety from potential flood and debris flows, etc.)

- Protect cultural resources from looting or vandalism.

- Stabilize soils and reduce offsite soil loss by establishing ground cover of desirable perennial vegetation in order to compete with invasive annual grasses and noxious weeds, reduce the likelihood of new weed establishment, reduce the potential for accelerated soil erosion (both wind and water), reduce sediment deposition into fish bearing and other perennial streams, protect and allow for the recovery of riparian areas within the fire;

- Reduce the risk of noxious weed and invasive annual grass infestations through Early Detection/Rapid Response (EDRR)

- Reduce invasive annual grass presence within the burned area in order to protect greater sage-grouse habitat and other wildlife habitat from future high intensity wildfire.

All of the foregoing factors indicate a *Need* for a more effective invasive plant control program.

Issues

In the context of this Environmental Assessment, an issue is a point of disagreement, debate or dispute based on an anticipated environmental effect of an action. There are numerous issues present in the areas burned by the Bendire Complex fires. The need for the action is based upon the following issues:

1. **Do herbicides used for noxious weed treatment and annual grass control pose an unacceptable risk to human health and non-target wildlife and vegetation?**

2. **What are the effects of invasive plant treatments on wildlife habitat recovery after the Bendire complex fires?**

3. **How would the alternatives reduce the spread of invasive annual grasses and other noxious weeds?**

4. **How would the alternatives affect native plant communities and their recovery after the fire?**

5. **What are the effects of herbicides on biologic soil crusts?**

6. **How would the alternatives affect future wildfire frequency and intensity?**

7. **How the alternatives improve or maintain the relevant and important values of the Research Natural Areas?**

8. **How would the alternatives affect fungi, plants and wildlife used for American Indian subsistence, religious or ceremonial purposes?**

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

Resource Objectives

The following management objectives are from the *Southeastern Oregon Record of Decision/Resource Management Plan* (ROD/RMP, 2002) as amended by the *Oregon Greater Sage-Grouse (GRSG) Approved Management Plan Amendment* (ARMPA) Record of Decision (ROD, September 2015):

- Rangeland Vegetation (RMP-38): "Restore, protect, and enhance the diversity and distribution of desirable vegetation communities including perennial native and desirable introduced plant species. Provide for their continued existence and normal function in nutrient, water, and energy cycles"
- Rangeland Vegetation (RMP-40): "Manage big sagebrush cover in seedings and on native rangeland to meet the life history requirements of sagebrush-dependent wildlife.
- Rangeland Vegetation (RMP-41): "Control the introduction and proliferation of noxious weed species and reduce the extent and density of established weed species to within acceptable limits."
- Fire (GRSG ARMPA – 2-16): "Objective WFM 1: Manage wildland fire and hazardous fuels to protect, enhance, restore Greater Sage-grouse habitat.
- Fire (GRSG ARMPA – 2-16): "Objective WFM 2: Use a combination of vegetation management and wildfire response to minimize the probability of a wildfire tripping an adaptive management trigger for habitat within an Oregon PAC.
- Vegetation (GRSG ARMPA – 2-15): "Goal VG 1: Increase the resistance of Greater Sage-grouse habitat to invasive annual grasses and the resiliency of Greater Sage-grouse habitat to disturbances such as fire and climate change to reduce habitat loss and fragmentation."
- Vegetation (GRSG ARMPA – 2-15): "Goal VG 3: Use integrated vegetation management to control, suppress, and eradicate invasive plant species per BLM Handbook H-1740-2. Apply ecologically based invasive plant management principles in developing responses to invasive plant species."
- SSS Plants (RMP-43): "Objective: Manage public land to maintain, restore, or enhance populations and habitats of special status plant species. Manage in order to conserve or lead to the recovery of threatened or endangered species."
- Water Resources (RMP-48): "Restore, maintain, or improve riparian vegetation, habitat diversity, and associated watershed function to achieve healthy and productive riparian areas and wetlands. "
- SSS (RMP-51): "Manage public land to maintain, restore, or enhance populations and habitats of special status animal species. Manage in order to conserve or lead to the recovery of threatened or endangered species."
- Wildlife (RMP-51): "Manage upland habitats in forest, woodland, and rangeland vegetation types so that the forage, water, cover, structure, and security necessary for wildlife are available on the public land."
- Rangeland/Grazing Use (RMP-56): "Provide for a sustained level of livestock grazing consistent with other resource objectives and public land use allocations."
- Cultural Resources (RMP-106): "Protect and conserve cultural and paleontological resources."

- Cultural Resources (RMP- 107) “Increase the public’s knowledge of, appreciation for, and sensitivity to cultural and paleontological resources.”
- Cultural Resources (RMP-107): “Consult and coordinate with American Indian groups to ensure their interests are considered and their traditional religious sites, landforms, and resources are taken into account.”

Decision to be Made

The Malheur Resource Area Field Manager will decide whether to adopt the Proposed Action and whether to modify the action based on factors identified during public review of this EA and unsigned Finding of No Significant Impact (FONSI). The decision-maker will make the decision based on the analysis of the issues and how well the alternatives respond to the *Need* and *Purposes*. The decision-maker will also decide whether the analysis reveals a likelihood of significant adverse effects from the selected alternative that cannot be mitigated or that were not already revealed in one or more of the Environmental Impact Statements that this EA tiers to. The BLM decision will apply to the Bendire Invasive Plant Management Project area and will address which, if any, burned area stabilization and rehabilitation invasive plant treatment activities will occur.

Consultation

Tribes

Within the last 9 years scoping was initiated to American Indian Tribes in association with the following vegetation environmental assessments:

- 2008 Vegetation Treatments Using Herbicides on BLM Lands in Oregon FEIS
- 2015 Draft Integrated Invasive Plant Management Environmental Assessment for Vale District
- 2016 Draft Bendire Complex Fire Emergency Stabilization and Rehabilitation Invasive Plant Management Plan

No tribal comments were received with any of the identified interrelated assessments. Project design features in this analysis will further coordination with the appropriate tribes and are addressed Project Design Feature Section of Chapter 2.

State Historic Preservation Office (SHPO)

In Oregon, the BLM will follow the 2015 State Protocol between the Oregon BLM and the Oregon SHPO regarding the manner in which the Bureau of Land Management will meet its responsibilities under the National Historic Preservation Act and the National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and The National Conference of State Historic Preservation Officers (Oregon SHPO and USDI 2015). Under this agreement, some treatments would be exempt from field survey and consultation with SHPO (for example, herbicide application where it would be unlikely to affect rock art images or traditional Native American plant gathering areas as determined in consultation with affected tribes).

Tiering and Reference

This EA tiers to the *Vegetation Treatments Using Herbicides on BLM Lands in Oregon Final Environmental Impact Statement* (Oregon FEIS,USDI 2010) for its herbicide treatments analysis in Oregon and to the 1985/87 Northwest Area Noxious weed Control Program Final EIS and Supplement (USDI 1985,1987) for treatments. The potential for herbicides to harm wildlife, fish, people, non-target plants, and other elements of the environment has been examined in detail in existing Risk Assessments in the Oregon FEIS. Where the Risk Assessments identified a potential for an adverse effect, mitigation measures from the Oregon FEIS were incorporated into the selected alternative and would eliminate the potential for significant adverse effects. The Risk Assessments and the mitigation measures served as a primary information source for much of the analysis of effects.

This EA also incorporates by reference elements of the 2007 *Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report* (PEIS, USDI 2007), which describes the integrated vegetation management program and discloses the general effects associated with non-herbicide control methods.

The EA also tiers to the Southeastern Oregon Resource Management Plans (BLM, 2002), which include invasive plant control activities in the full range of ongoing management activities for which environmental effects are described.

Conformance with Land Use Plans, Laws, Policies and other Decisions

The alternatives analyzed are in conformance with the 2002 Southeastern Oregon ROD/RMP, as amended by the Oregon Greater Sage-Grouse Approved RMP Amendment (ARMPA). Even though ESR activities are not specifically provided for, they are consistent with the goals and objectives described as resource objectives above.

The proposed action conforms to the 2009 Vale District Fire Management Plan (BLM, 2009, FMP). The Bendire Complex burned within the Owyhee West (Block B-2) and the Juntura (Block B-3) fire management units (FMU) as defined in the Vale District FMP. The Vale District FMP states that an objective for the Owyhee West FMU is to, "… use mechanical treatments combined with herbicides, planned ignitions, and seedings to convert annual types to more diverse perennial species less conducive to wildfire spread in appropriate areas." The Vale FMP goes on to state that all ESR activities must conform to the BLM Supplemental Emergency Stabilization and Rehabilitation Guidance Handbook (H-1742-1) and the applicable RMP (Southeastern Oregon RMP.

Federal Land Policy and Management Act

The *Federal Land Policy and Management Act* (1976) requires that all management decisions be consistent with the approved land use plan (43 CFR 1610.5-3). Management activities on the Vale District are covered by the *Southeastern Oregon Resource Management Plan and Record of Decision* (BLM, 2002). This is the primary governing land use plan for the area and provides the following goals and management direction related to noxious weed management:

Southeastern Oregon Resource Management Plan and Record of Decision

Relationship to Other BLM Planning Documents:

> "There are several existing activity plans that are acknowledged as current guidance. They will be updated or modified, as necessary, to include current information and/or to be in conformance with the approved RMP [Resource Management Plan]. These plans include […] noxious weed control […]" (BLM 2002b:14).

Rangeland Vegetation

> ***Objective 3: Control the introduction and proliferation of noxious weed species and reduce the extent and density of established weed species to within acceptable limits.***
>
> *Management Actions:* "The distribution and density of noxious weeds will be reduced through the application of approved control methods in an integrated program in cooperation with the State of Oregon, Malheur County, and other adjoining counties, adjoining private landowners, and other affected agencies and interests. Control methods will include preventive management to maintain competitive vegetation cover and reduce the distribution and introduction of noxious weed seed; manual and mechanical methods to physically remove noxious weeds; biological methods to introduce and cultivate factors that naturally limit the spread of noxious weeds; cultural practices; and application of chemicals. Target species will include those identified by county, state, and BLM weed priority lists" (BLM 2002:41).

Management Common to all ACECs

> "Noxious weeds will be aggressively controlled using integrated weed management methods, such as biological control, site-specific spraying, and grubbing by hand, consistent with protection and enhancement of relevant and important values" (BLM 2002:68&73).

Monitoring

> A monitoring plan for each resource area would be developed during the implementation of the land use plan, and would include a monitoring and evaluation schedule. Monitoring has been or will be designed in conjunction with the activity plans, or as needed to monitor specific objectives (BLM 2002:138).

Invasive Plant/Noxious Weed Management

Several Federal laws and Executive or Secretarial Orders direct the BLM to aggressively manage invasive plants and other vegetation to improve ecosystem health and reduce fire risk. Section 302(b) of the *Federal Land Policy and Management Act* of 1976 directs BLM to "take any action necessary to prevent unnecessary or undue degradation of the lands" (43 U.S.C. § 1732(b)(2)). Executive Order 13112 (February 1999) requires Federal agencies to "(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive

species populations accurately and reliably; [and] (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded…" In particular, the *Carlson-Foley Act* of 1968 (43 U.S.C. §§ 1241-1243) and the *Plant Protection Act* of 2000 (7 U.S.C. § 7702), authorize the BLM to manage noxious weeds and to coordinate with other Federal and State agencies in activities to eradicate, suppress, control, prevent, or retard the spread of any noxious weeds on Federal lands. The *Federal Noxious Weed Act* of 1974 (7 U.S.C. § 2814(a)) established a program to manage undesirable plants, implemented cooperative agreements with State agencies, and established integrated management systems to control undesirable plant species. Secretarial Order 3336 (January 2015) directs agencies to "Seek to reduce the likelihood, size, and severity of rangeland fires by addressing the spread of cheatgrass and other invasive, non-native species."

Integrated Vegetation Management (BLM Manual Handbook 1740-2)

This EA is consistent with BLM Manual Handbook 1740-2, which guides the implementation of vegetation management planning and treatment activities to maintain and restore native plant communities, diversity, resiliency, and productivity, by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risk (USDI 2008a).

Vegetation Treatments Using Herbicides on BLM Lands in Oregon FEIS and Record of Decision

This EA tiers to, and is consistent with, the Oregon FEIS and Record of Decision. The 2010 Record of Decision for *Vegetation Treatments Using Herbicides on BLM Lands in Oregon* requires, with few specific exceptions, the preparation of new site-specific analyses before herbicides other than 2,4-D, dicamba, glyphosate, or picloram can be used (USDI 2010). This EA provides the site-specific analysis for the Bendire Complex Invasive Plant Management. Both the No Action Alternative and the Alternative selected by the Decision Record for this EA must adhere to the existing Standard Operating Procedures and other elements adopted by the Oregon Record of Decision (USDI 2010:30). The "other elements" are the 2007 Mitigation Measures from *the Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic FEIS* (PEIS) shown together with the Standard Operating Procedures in the *Oregon Record of Decision* Attachment A (USDI 2010:33), the Conservation Measures for Special Status species shown in Oregon Record of Decision Attachment B (USDI 2010:47), and the Oregon Mitigation Measures[3] included in the Oregon Record of Decision (USDI 2010:12-15), are included in part in Appendix A of this EA. The typical and maximum application rates if they are less than those in the existing National Environmental Policy Act (NEPA) documents would be used and are incorporated into the Alternatives and by reference from the Oregon FEIS (USDI 2010b:10-11).

Greater Sage-Grouse Management Policies and Procedures

The *Southeastern Oregon Management Plan* (BLM, 2002) was amended with completion of the Oregon Sub-Region Greater Sage-Grouse Approved Resource Management Plan

[3] Mitigation measures are practices or limitations adopted to mitigate potential adverse effects identified in the PEIS and Oregon FEIS analysis.

Amendment (ARMPA September, 2015) and Environmental Impact Statement and appurtenant Record of Decision. The Proposed Action in the Final EIS includes management direction to control invasive annual grasses to restore Greater sage-grouse habitat (ARMPA: 2-10).

Federal Strategy to Promote the Health of Pollinators

On June 20, 2014, the President issued a memorandum for heads of executive departments and agencies directing the establishment of a Pollinator Health Task Force, chaired by the Secretary of Agriculture and Administrator of the Environmental Protection Agency. The memorandum directs the creation of a national Pollinator Health Strategy with research, education, and public-private partnership objectives. It further directs agencies to develop plans and practices for increasing and improving pollinator habitat, including the use of pollinator-friendly species in future restoration and rehabilitation projects, following wildfires, and in landscaping.

Nothing about the Proposed Action or the analysis in this EA conflicts with the objectives of this new direction. Memorandum-described pollinator direction, as it is developed, may supplement but is not expected to conflict with, treatments described in this EA.

Consistency with Other Laws, Regulations, and Policies

The Proposed Action has been designed to conform to the following documents, which direct and provide the framework for management of BLM lands within Burns and Vale Districts:

- Secretarial Order 3336, Rangeland Fire Prevention, Management, and Restoration
- Taylor Grazing Act (43 U.S.C. 315), 1934
- The NEPA (42 U.S.C. 4320-4347), 1970
- Federal Land Policy and Management Act (43 U.S.C. 1701), 1976
- Public Rangelands Improvement Act (43 U.S.C. 1901), 1978
- August 12, 1997 Standards for Rangeland Health and Guidelines for Livestock Management for Public Lands Administered by the BLM in the States of Oregon and Washington
- Northwest Area Noxious Weed Control Program EIS, 1985
- Northwest Area Noxious Weed Control Program Record of Decision. 1986
- Supplement to the Northwest Area Noxious Weed Control Program Final Environmental Impact Statement,1987
- Vale District 5 Year Integrated Weed Control Plan Environmental Assessment, 1989
- 2007 Vegetation Treatments Using Herbicides on BLM lands in 17 Western States ROD (National Veg. Final Environmental Impact Statement (FEIS))
- 2010 Vegetation Treatments Using Herbicides on BLM Lands in Oregon Record of Decision (ROD) (Oregon Veg. FEIS)
- Clean Water Act (33 U.S.C. 1251 - 1376; Chapter 758; P.L. 845, June 30, 1948; 62 Stat. 1155)
- Clean Air Act, 42 U.S.C. 7470, et seq., as amended
- National Historic Preservation Act (16 U.S.C. 470)

- State, local, and Tribal laws, regulations, and land use plans
- Executive Order 12372, Intergovernmental Review
- Executive Order 13112, Invasive Species
- Executive Order 11990, Protection of Wetlands
- Executive Order 11988, Floodplain Management
- Archaeological Resources Protection Act (ARPA)
- Native American Graves Protection and Repatriation Act (NAGPRA)
- American Indian Religious Freedom Act (AIRFA)
- BLM Manual Section 8120: "Tribal Consultation under Cultural Resource Authorities
- 2015 Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment (ARMPA)
- Wilderness Manual 6330
- National Technical Team Report, 2012
- USFW Listing - Federal Register notice dated October 2, 2015, the US Fish and Wildlife Service determined that the listing of the greater sage-grouse is not warranted at this time" (80 FR 191, p 59858-59942). "
- Area of Critical Environmental Concern Manual 1613
- Supplemental Program Guidance for Land Resources Manual 1623

Other Authorities Specific to Vale District

- Vale BLM District Five Year Integrated Weed Control Plan EA (OR-030-89-19, 1989)
- Vale District Normal Fire Emergency Stabilization and Rehabilitation Environmental Assessment (OR-030-2005-05, NFESRP, 2005)

Public Involvement/Scoping

As public land fire incidents are contained, BLM initiates an interdisciplinary team (IDT) review process to utilize existing data to develop an initial (completed within seven days after the fire is declared "Contained") ESR Plan. This plan is a notice to the national BLM office of potential ESR projects and funding requests. Vale BLM followed this up with field surveys to develop the final (21-Day Plan). The ESR Plan details proposed actions to respond to the emergency nature of fire impacts and rehabilitation.

Additional coordination and cooperation with the USDA Natural Resource Conservation Service (NRCS), the Oregon Department of Fish & Wildlife, Oregon State University Cooperative Extension Service, Oregon Department of Agriculture (Noxious Weed Division), Malheur County Weed Inspector, and local grazing permittees assisted the BLM to further tailor the ESR actions within the Bendire Fire area.

The ESR Plan actions were reviewed by Vale BLM IDT members and managers through a process called a Determination of National Environmental Policy Act (NEPA) Adequacy (DNA). A DNA is not a component of NEPA; rather, it is an IDT review process that confirms that an action is adequately analyzed in existing NEPA documents and whether the action is in conformance with the land use plan. Vale BLM determined that existing NEPA

(namely the SEORMP and the 2005 Vale District Normal Fire ESR Plan Environmental Assessment (NFESRP)) had adequately analyzed the proposed actions within the Bendire Complex ESR Plan. On October 26, 2015, BLM issued a Decision to implement the Bendire Complex Emergency Stabilization and Rehabilitation Plan.

The NFESRP commits the Vale BLM to completing the DNA, and with the issuance of the Decision to implement the ESR Plan, the public is notified of the proposed actions. Vale BLM issued public notice mailings to approximately 80 interested publics and published notices in the pertinent local newspapers. The public was informed of the ESR actions in the Decision. The project implementation period began with a Decision to be put into "immediate effect" (43 CFR 4190), given the emergency needs of stabilizing resources and moving into the fire rehabilitation effort in the burned area.

On November 21, 2015 the Decision was appealed to the Interior Board of Land Appeals (IBLA). After discussion with the appellant, BLM requested that the IBLA vacate and remand the Decision back to the BLM for further consideration. In particular, Vale BLM desired to garner additional public comment and more fully analyze under NEPA the proposed application of certain herbicides.

This Environmental Assessment and draft Finding of No Significant Impact will be provided to the public for review and comment for 30 days. All identified interested public and Tribes will be notified directly and public notices published in the pertinent newspapers. The comment period is limited to meet the emergency nature of the fire impacts, to meet seasonal and optimum invasive plant seed germination windows.

If field conditions allow access to the Project Area and if there is interest by members of the public, a field visit to the burned area and proposed projects may be scheduled.

The final Decision will be based on public comments and Tribal consultation on the alternatives. If significant impacts are not identified the final FONSI and IDT responses to public comments will be published with the Decision.

Issues Considered but not Analyzed Further

Greenhouse Gas Emissions and Climate Change

Greenhouse Gas Emissions and Climate Change will not be analyzed in this EA for the following reason:

Changes in greenhouse gas levels affect global climate. Forster et al. 2007, (pp. 129-234) 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 (USGS), in a May 14, 2008 memorandum to the USFWS 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.

CHAPTER II: ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives Considered but Eliminated from Detailed Analysis

Exclusion of all herbicides to treat invasive weed infestations

Analyzing alternatives that exclude all herbicides would not be effective because invasive annual grasses and noxious weeds spread aggressively and establish homogenous exotic weed communities. The BLM has trend and photographic monitoring data in conjunction with scientific research that shows the decline in native perennial and annual plant communities specific to the Wyoming big sagebrush steppe (Davies, 2010). Research has found that treating noxious weeds and invasive annual grasses, such as medusahead rye and cheatgrass, with the proposed herbicides and revegetating the area with desirable plant species, can significantly increase a plant community's diversity, resilience to disturbance, and resistance to noxious weed spread and establishment (Davies 2010; Davies and Sheley 2011). Manual treatments (grubbing) alone are not practical as a weed treatment program, given the extent of BLM-administered lands in the Bendire Complex project area, and the extent of the noxious and invasive weed threat to public resources. Additionally, rhizomatous perennial species such as Canada thistle, Russian knapweed and whitetop species thrive when root mass is disturbed by manual or mechanical means. Herbicides are the only tool effective in treating these species.

Utilizing classical biological methods

There are no weed populations in the Project area that are large enough to support classical biological control (usually insects). Classical biological control refers to a subset of organisms that includes plant-eating insects, nematodes, mites, or pathogens. Biological control is used to reduce the targeted invasive plant population to an acceptable background level by stressing target plants and reducing competition with desirable plant species.

The biological control agents are not successful unless there are sufficient invasive plants for them to feed upon. In the Bendire Project area, populations of known noxious weeds with approved biological controls do not have large enough population acres to support their use.

Project Design Features Common to Both Alternatives

Project Design Features (PDFs) were developed to aid in meeting project goals and objectives. These features are nonexclusive and are subject to change based on site-specific terrain characteristics (topography and vegetation). Changes, additions, or deletions would be made through coordination with appropriate BLM specialists and approved by the Malheur Field Office Field Manager. The Industrial Fire Precaution Levels (IFPLs) would be followed during construction, where appropriate.

a. Coordination with the tribes pertaining to the Annual Treatment Plan will produce and identify areas where herbicide use would not be consistent with cultural values and uses, alternatives will be implemented where feasible. One month prior to beginning

treatments, Annual Treatment Plans will be presented to the tribes showing planned treatments. Any subsequent coordination will identify where treatments can be delayed, where cultural features must be avoided or protected and where posting would help tribe members avoid areas. Maps of known invasive plant infestation can also be shared with the tribes at this time.

b. Section 106 compliance measures will be implemented. When a vegetation treatment project is proposed, the 2015 Oregon BLM/SHPO Protocol would be researched for applicability. If the proposed treatment is not identified in the protocol, cultural survey needs would be determined and survey would be completed prior to vegetation treatments. The survey would assess the proposed treatments in conjunction with the effects on cultural resources prior to any ground disturbing activities.

c. Should noxious weeds be found, appropriate control treatments would be performed in conformance with the Vale District Five Year Integrated Weed Control Plan EA (BLM, 1989), or subsequent decision. Herbicide and adjuvant use would be limited to the Herbicide (and Adjuvant) Formulations Approved for use on BLM Lands lists (Appendices C.2 and C.3 from Weed EA) and would conform to label guidance and restrictions as required by law, (C.1) from Weed EA. Each treatment would be subject to appropriate Standard Operation Procedures, Best Management Practices and Mitigation Measures contained in the ROD and FEIS for Vegetation Treatments Using Herbicides on BLM Lands in Oregon (2010) and in Table 2 of the Final Vegetation Management EIS Environmental Report (ROD, October 2007), or its successor, would be utilized as a part of the project design.

d. The risk of noxious weed introduction would be minimized by ensuring all equipment (including all machinery, ATVs, and pickup trucks) is cleaned prior to entry to the sites, minimizing disturbance activities, and completing follow-up monitoring, to ensure no new noxious weed establishment occurs.

e. One month prior to beginning treatments, Annual Treatment Plans would be presented to the tribes showing planned treatments as well as major survey and treatment areas. Any subsequent coordination will identify where treatments can be delayed, where cultural features must be avoided or protected and where posting would help tribe members avoid areas. Maps of known invasive plant infestation can also be shared with the tribes at this time

f. Where coordination with the Burns Paiute Tribe regarding the Annual Treatment Plan identifies areas where herbicide use would not be consistent with cultural values and uses; alternatives will be implemented where feasible

g. Monitoring to determine effectiveness of treatments, natural recovery, needs for additional stabilization and rehabilitation, and to determine if grazing can resume would occur for at least three years from the date of containment.

h. Provide protective measures to prevent damage to Special Status Plants. Measures may include:
   - Provide clearances for Special Status species before treating an area as required by Special Status Species Program policy. Consider effects to Special Status Species when designating herbicide treatment.
   - Use a selective herbicide and a wick or backpack sprayer to minimize risks to Special Status plants.
   - Avoid treating vegetation during time-sensitive periods for Special Status plants in areas to be treated.
   - Use treatment buffers outlined in Standard Operating Procedures (SOPs, Appendix A) to prevent unintended affects to Special Status plants.

i. For petroleum products or other Hazardous Material handling, the operator would be required to comply with all applicable State and Federal laws and regulations concerning the storage, use and disposal of industrial chemicals and other hazardous materials. Accidental spills or discovery of the dumping of any hazardous materials would be reported to the Authorized Officer and the procedures outlined in the *Vale District BLM Environmental Contingency Plan for Emergency Preparedness and response to Oil and Hazardous Materials Incidents* (2012) would be followed.

j. Hazardous materials (particularly petroleum products) would be stored in appropriate and compliant UL-Listed containers and located so that any accidental spill would be fully contained and would not escape to ground surfaces or drain into watercourses. Other hazardous materials, such as corrosives and/or those incompatible with flammable storage would be kept in appropriate separated containment. All construction materials and waste would be removed from the project area.

No Action Alternative

The No Action alternative would be a continuation of the use of the existing four herbicides (2,4-D, dicamba, glyphosate, or picloram, see Table 2.2 for Herbicide Information) analyzed through the 1986 Northwest Area Noxious Weed Control Program EIS and 1987 Supplemental EIS (USDI, 1986 and 1987), associated Records of Decision. These herbicides, along with 13 additional herbicides were analyzed with updated information on – among other characteristics – toxicity, risk assessments, translocation, appropriate target species and minimum/maximum rates in the 2007 PEIS (USDI, 2007) and subsequently the Oregon FEIS (USDI, 2010). Those considerations of use and impacts are herein incorporated by reference. For convenience, much of the pertinent data for those analyses are duplicated in the sections which follow and in the appendices.

Under the existing Vale District Five Year Integrated Weed Control Plan EA (BLM, 1989 which subsequent management decisions have re-authorized), Vale District is not authorized to use the most effective herbicides to treat invasive annual grasses and other noxious weed species identified in the Oregon FEIS (2010). Herbicide application would be limited to only federally, state or county listed noxious weed species. See Table 2.1 for proposed treatment and inventory acres under the No Action Alternative.

Tables 2.2 and 2.3 identify the four herbicides analyzed in this alternative and their typical application rates; restrictions and target weed species for which they would be used within the project area.

Approximately 35 acres of noxious weeds are known to exist within the Bendire Complex Project Area (See Map 4). It is estimated that an additional 35-65 acres of these species are also likely to be present. Treatment of these infestations would occur on small sites (ranging from single plant to generally less than 0.5 acres) with the existing authorized herbicides. However, treatment of certain noxious weed species (for example, whitetop) would be limited because none of the four herbicides in the No Action Alternative provide effective control. Continued monitoring would be conducted over the 5 year project monitoring period to locate additional populations. These will be treated appropriately (manual or herbicide treatments) under the Early Detection and Rapid Response (EDRR) emphasis.

Table 2.1: Summary of Herbicide Treatments by Alternative for the Bendire ESR Project Area

Treatment	No Action Alternative (acres)	Proposed Action Alternative (acres)
Noxious Weeds Treatments		
Project Area Weed Inventory	53,733	53,733
Invasive Annual Grass Aerial Herbicide Application, Imazapic	0	28,760
Ground-based Herbicide Application of known noxious weed species (small-site applications	35	35
EDRR Ground-based Herbicide Application of suspected noxious weed species (small site applications)	35-65	35-65
Monitoring	• Effectiveness of herbicide Applications • Cultural sites	• Effectiveness of herbicide Applications • Cultural sites

Additional weed treatments within the Project Area would occur as a part of the District wide weed treatment program. No additional treatments would occur as a part of the Bendire ESR Invasive Plant Management effort.

Proposed Action Alternative: Implementation of the Bendire Complex ESR Plan for Noxious and Invasive Weed Treatments

The Proposed Action is to inventory and treat the Bendire Complex Fire Project Area (Map 2) for noxious weeds and invasive annual grasses. Actions proposed in this Alternative are as follows:

Project Area Weed Inventory

During the first year post-fire, the portions of the Bendire Complex project area at the highest risk for noxious weed invasion would be inventoried. The majority of this

inventory would be in the portion of the burned areas along the major roads. This inventory would determine the extent of noxious weeds expansion

Spot treatments of known infestations would be treated under the District's treatment plan and new infestations would be treated as soon as practicable according to phenological windows and other environmental conditions allow as part of the District's EDRR process for new discoveries.

If additional invasive annual grasses areas are discovered, they would be treated by the appropriate method (on the ground or aerially) with an application of imazapic, using the appropriate rates of application.

Invasive Annual Grass Aerial Herbicide Application, Imazapic

Between 2016 and 2020, up to 30,000 acres of invasive annual grasses within the project area would be treated aerially in order to prevent the area from becoming dominated by those species (Map 4). Cheatgrass is known to be present throughout the burned area, including the proposed aerial treatment areas. Intermixed with the cheatgrass in these treatment areas are approximately 15,000 acres of light to moderate medusahead infestations. Small sites of ventenata are scattered within the areas also. Treatments of these targeted species would occur as a pre-emergent application using the approved herbicide, imazapic, at 6oz/acre along with appropriate adjuvants (see Table C-3 in Appendix C for adjuvants) to achieve the most effective control at the time of application.

Aerial imazapic treatments would be done by commercially contracted aircraft. The type of aircraft used for specific portions of the work would depend on topography and availability of landing and reloading locations. For safety reasons, where aerial application of herbicides is to be done by contract, the contractor would determine which type of aerial application is most appropriate for the site conditions.

Where aerial applications are determined to be the most appropriate treatment for the control of invasive annual grasses, its use would be in conformance with label instructions and the 2010 Vegetation Treatments Using Herbicides on BLM Lands in Oregon Record of Decision. All design elements, mitigations, and SOPs (Appendix A) described in the ROD would be used.

Noxious Weed Herbicide Treatments- Ground Based Herbicide Application

Noxious weed treatments in the Proposed Action would be applied to the same set of identified weed species as in the No Action Alternative; however, the effectiveness of the additional herbicides is greater. As stated in the No Action Alternative, there are known populations of noxious weeds within the project area of approximately 35 acres. Confirmed acres by species are provided in Table 3.6, Noxious Weeds section, below.

It is also suspected that an additional 35-65 acres of noxious weeds within the project area may need spot treatments.

Monitoring and Retreatment

Effectiveness monitoring would be conducted for at least five years to ensure previous treatments are meeting objectives. If noxious weeds or invasive annual grasses are discovered, the area of reinfestation would be retreated. Retreatments of broadleaf noxious weeds are expected to become progressively smaller in subsequent years.

As conditions and funding permit, if treatment effectiveness monitoring of treated areas of invasive annual grasses indicates reinfestation is occurring, retreatment may be necessary and would occur limited to those identified areas to achieve the desired objectives of a healthy perennial grass, forb and shrub community that is resistant to invasive annual grasses. An interdisciplinary team would assess the need for retreatment.

Design Features Specific to the Proposed Action

No more than 10% of the North Ridge Bully Creek RNA and South Ridge Bully Creek RNA would be retreated with imazapic.

All aerial treatment support and staging areas will be revegetated, if needed, and/or treated for invasive and noxious weed species, if present, as per SOPs.

Table 2.2: Herbicide Information

Dark background indicates that the herbicide is available for use on only designated noxious weeds under the No Action Alternative.
Light background indicates additional herbicides added to those in the No Action Alternative for use under the Proposed action
All herbicides listed below are available for use in the Bendire Fire ESR Project Area on invasive plants under the Proposed Action.

Herbicide: Representative Trade Names[1] *Common Targets*	**Selective to Plant Types** Pre/post emergent *Point of application*	**General Constraints From Label[11]**	**Areas Where Registered Use is Appropriate**							**Application Rate (lbs. / acre / year)** Typical *Max[2]*	**Aerial Spray[9]**	**Half-life in Soils (days)**
			Rangeland	*Forest and Woodland*	*Riparian / Seasonal Wetland*	*Aquatic / Wetland*	*Oil, Gas, & Mineral Sites*	*Rights-of-Way*	*Recreation & Cultural Sites*			
2, 4-D: Many, including Amine, Hardball, Unison, Saber, and Aqua-Kleen *Used in combination with other herbicides to control broadleaf plants*	**broadleaf** Post *Foliar*	– Toxic to aquatic invertebrates. – Only use approved formulations for streamside applications. – Drift or runoff may adversely affect aquatic invertebrates and non-target plants. – For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash waters.	√	√	√	√	√	√	√	1 *(1.9)*	Yes	10
Chlorsulfuron: Telar. Often used in combination with 2,4-D. *Biennial thistles, perennial mustards, toadflax, Mediterranean sage*	**broadleaf** Pre and early post *Soil or foliar*	– Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. – Do not contaminate water when disposing of equipment wash-water. – Do not treat frozen soil. – Applications to powdery, dry soil when there is low likelihood of rain soon may result in off-site damage by wind-borne soil particles.	√		√		√	√	√	0.047 *0.141[6]*	Restricted[4]	40
Clopyralid[,3]: Transline, Stinger, Spur. Often used in combination with 2,4-D or chlorsulfuron. *Hawkweeds, Knapweed, Mediterranean sage, Biennial thistles, starthistles*	**broadleaf** Post *Foliar*	– Do not apply where soils have a rapid to very rapid permeability close to aquifers. – Do not contaminate irrigation ditches or water used for irrigation or domestic uses. – Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. – Do not contaminate water when disposing of equipment wash-water. – Avoid spray drift.	√	√	√		√	√	√	0.35 *0.5*	Yes	40

Herbicide: Representative Trade Names[1] *Common Targets*	**Selective to Plant Types** Pre/post emergent *Point of application*	**General Constraints From Label[11]**	**Areas Where Registered Use is Appropriate**							**Application Rate (lbs. / acre / year)** Typical *Max[2]*	**Aerial Spray[9]**	**Half-life in Soils (days)**
			Rangeland	*Forest and Woodland*	*Riparian / Seasonal Wetland*	*Aquatic / Wetland*	*Oil, Gas, & Mineral Sites*	*Rights-of-Way*	*Recreation & Cultural Sites*			
Dicamba: Vanquish, Banvel, Diablo, Vision, Clarity *Used in combination with 2,4-D to control perennial mustards, biennial thistles, field bindweed, halogeton, puncturevine*	**broadleaf, woody plants** Pre and post *Foliar*	– To prevent point source contamination, do not mix or load this pesticide within 50 feet of wells (including abandoned wells and drainage wells), sinkholes, perennial or intermittent streams and rivers, and natural or impounded lakes and reservoirs. Do not apply this pesticide within 50 feet of wells. – Do not apply under conditions that favor runoff. Do not apply to impervious substrates such as paved or highly compacted surfaces in areas with high potential for ground water contamination. Ground water contamination may occur in areas where soils are permeable or coarse and ground water is near the surface.	√		√		√	√	√	0.3 *2[8]*	Yes	14
Glyphosate[3]: Many, including Rodeo, Mirage, Roundup Pro, and Honcho *Grasses, trees and shrubs, yellow flag iris*	**no** Post *Foliar*	– Only use approved aquatic formulations for aquatic applications. – Do not contaminate water when cleaning equipment or disposing of equipment wash waters. – Consult local state fish and game agency and water control authorities before applying this product to public water. – Treatment of aquatic invasive plants can result in oxygen depletion or loss due to decomposition of plants that can cause fish suffocation. – Avoid drift.	√	√	√	√	√	√	√	2 *4 or 7[5,10]*	Restricted[7]	47
Imazapic: Plateau, Panoramic *Annual grasses such as medusahead rye, cheatgrass, and ventenata*	**some broadleaf and grasses** Pre and post *Soil*	– Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. – Do not contaminate water when disposing of equipment wash-water. – To reduce run-off, avoid applications when rain is forecast w/in 48 hours.	√	√	√		√	√	√	0.0313 *0.1875*	Yes	120-140

Herbicide: Representative Trade Names[1] *Common Targets*	**Selective to Plant Types** Pre/post emergent *Point of application*	**General Constraints From Label[11]**	**Areas Where Registered Use is Appropriate**							**Application Rate (lbs. / acre / year)** Typical *Max[2]*	**Aerial Spray[9]**	**Half-life in Soils (days)**
			Rangeland	*Forest and Woodland*	*Riparian / Seasonal Wetland*	*Aquatic / Wetland*	*Oil, Gas, & Mineral Sites*	*Rights-of-Way*	*Recreation & Cultural Sites*			
Picloram: Triumph, OutPost, Tordon. Often used in combination with 2,4-D. *Field bindweed, knapweed, St. John's wort, starthistles, biennial thistles*	**broadleaf, woody plants** Pre and post *Foliar*	– Restricted use. May injure susceptible, non-target plants. This herbicide is injurious to plants at extremely low concentrations. Non-target plants may be adversely affected from drift and run-off. – Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. – Do not make application when circumstances favor movement from treatment site. Do not contaminate water or water sources when mixing, loading, or disposing of equipment wash-water. – May leach thru soil and contaminate ground water where soils are permeable, particularly where water table is shallow.	√	√			√	√	√	0.35 *1*	Yes	20-300

1. See Table C-2 (*Herbicide Formulations Approved for use on BLM-Administered Lands*) in Appendix C for the full list of herbicide trade names approved for use on lands managed by the BLM in Oregon, including formulations with two or more active ingredients.
2. Parentheticals denote herbicides that are limited by PEIS Mitigation Measures to typical application rates where feasible.
3. The State of Oregon limits the use of clopyralid. OAR 603-057-0378 states, "Any application or use of a pesticide product known to contain the active ingredient clopyralid to a location other than an agricultural site, forest site, right-of way site, golf course site, or non-turf area of a park or recreation site is prohibited. Regardless of application or use sites specified on individual product labels, no application or use may be made to lawn or turf areas such as residential lawns, commercial and public turf plantings, school grounds, parks, cemeteries or recreational areas other than golf courses."
4. Only allowed when no other means of application are possible.
5. The maximum application rate for glyphosate is 4 lbs. / acre for the No Action Alternative and 7 lbs. / acre under the Proposed Action.
6. Do not apply more than 0.0611 lbs. / acre per year in pasture or rangeland.
7. PEIS Mitigation Measures include "where practical, limit glyphosate [and hexazinone which is not proposed in this EA] to spot applications in grazing land and wildlife habitat areas to avoid contamination of wildlife food items" and "Livestock / Wild Horses and Burros: Where feasible, limit glyphosate [and hexazinone which is not proposed in this EA] to spot applications in rangeland"
8. Mitigation measures adopted by the Oregon Record of Decision state, "where there is a potential for herbivore [including wild horse and burro] consumption of treated vegetation, apply dicamba, [and imazapyr, and metsulfuron methyl which are not proposed in this EA] at the typical, rather than maximum, application rate to minimize risks."
9. Conservation Measures (see Appendix A) provide additional restrictions near Special Status species.
10. PEIS Mitigation Measures specify "Minimize potential risks to livestock by applying glyphosate at the typical application rate where feasible"
11. Not all label requirements are listed. All label requirements are followed.

Table 2.3: Herbicide Treatments – Rates, Application and Example Target Species

Herbicide & Rate	Season/Method of Application	Examples of Weed Species
Chlorsulphuron: Telar XP (1 oz./ acre; 0.047 lbs./acre of active ingredient Chlorsulphuron) + *2,4-D* (1 qt./acre; 0.95 lbs./acre of active ingredient 2,4D)	Typical application window is during rosette to early flower stage. Sometimes apply in fall on fall rosettes. Application method would be low-boom or spot spray.	Mediterranean Sage Biennial thistles
Chlorsulphuron: Telar XP (1 oz./ acre; 0.047 lbs./acre of active ingredient Chlorsulphuron) + *2,4-D* (1 qt./acre; 0.95 lbs./acre of active ingredient 2,4D)	Typical application window is full flower stage. Application method would be low-boom or spot spray.	White top
Chlorsulphuron: Telar XP (1 oz./ acre; 0.047 lbs./acre of active ingredient Chlorsulphuron) + *2,4-D* (1 qt./acre; 0.95 lbs./acre of active ingredient 2,4D)	Typical application window is full flower stage. Application method would be low-boom or spot spray.	Perennial pepperweed
Chlorsulphuron: Telar XP (1 oz./ acre; 0.047 lbs./acre of active ingredient Chlorsulphuron) + *2,4-D* (1 qt./acre; 0.95 lbs./acre of active ingredient 2,4D)	Typical application window is during rosette to early flower stage. Sometimes apply in fall on fall rosettes. Application method would be low-boom or spot spray.	Canada thistle
Clopyralid: Transline (1 pt./acre; 0.37 lbs./acre of active ingredient Clopyralid); may add *2,4-D* (1 qt./acre; 0.95 lbs./acre of active ingredient 2,4D); may add *Chlorsulphuron:* Telar	Typical application window for this type of treatment would be fall (late season) when desirable vegetation is least susceptible to damage. Application method would be low-boom or spot spray.	Canada Thistle Russian Knapweed
Imazapic: Plateau (6 oz/acre; .09375 lbs/acre of active ingredient) Could be used at 2-12 oz/acre, depending on the location and associated species at the treatment site.	Typical application window is as a pre-emergent in late summer/early fall.	Medusahead rye, cheatgrass, ventenata, and other annual invasive species
Picloram (1 qt/ac; .5 lb/ac active ingredient + 2,4-D (1 qt/ac; .95 lb/ac active ingredient)	Typical application window is during rosette to bud stage. Application method would be low-boom to spot spray.	Spotted, diffuse knapweeds; yellow starthistle; dalmatian toadflax,; Mediterranean sage
Picloram (1 pt/ac; .25 lb/ac active ingredient + 2,4-D (1 qt/ac; .95 lb/ac active ingredient)	Typical application window is during bud to flowering stage. Application method would be low-boom to spot spray.	Russian knapweed; Canada thistle
Picloram (1 pt/ac; .25 lb/ac active ingredient + 2,4-D (1 qt/ac; .95 lb/ac active ingredient)	Typical application window is during rosette to flowering stage. Application method would be low-boom to spot spray.	Scotch and bull thistles
Picloram (1 pt/ac; .25 lb/ac active ingredient + 2,4-D (1 qt/ac; .95 lb/ac active + dicamba (1 pt/ac; .5 lb/ac active ingredient)	Typical application window is during rosette stage in areas where residual is desired for heavy seedbank. Application method would be low-boom to spot spray.	Scotch and bull thistles
Picloram (1 qt/ac; .5 lb/ac active ingredient)	Typical application window is post frost in the fall for active crown uptake. Application method would be low-boom to spot spray.	Russian knapweed Canada thistle

Herbicide & Rate	Season/Method of Application	Examples of Weed Species
2,4-D (1 qt/ac; .95 lb/ac active ingredient + dicamba (1 pt/.5 lb/ac active ingredient)	Typical application window is flowering to early maturity stage. Results expected are for short term control to stop spread. Application method would be low-boom to spot spray.	Perennial pepperweed; whitetop ssp.
2,4-D (1 qt/ac; .95 lb/ac active ingredient + dicamba (1 pt/.5 lb/ac active ingredient)	Typical application window is during spring and fall rosettes stages. Application method would be low-boom to spot spray.	Scotch and bull thistles
Glyphosate (1 pt/ac; .5 lb/ac active ingredient)	Typical application window is seedling stage. To monocultures, application method would be low-boom. If there is danger of offsite damage, application method would be spot spray. At 16 oz rate, many perennial grasses are minimally affected.	Annual grasses
Glyphosate (3 qt/ac; 3 lb/ac active ingredient	Typical application window is to actively growing plants. Application method is directed spot spraying to target plants to minimize offsite damage to desirable vegetation	Perennial pepperweed; whitetop ssp.; aquatic formulations in riparian areas near water

Table 2.4: Effects of Herbicide Treatments

Herbicides available under both alternatives	
2,4-D	2,4-D is effective on a wide range of broadleaf invasive plants while not affecting most grasses. 2,4-D can help inhibit seed production, prevent herbicide resistance, and effectively treat multiple invasive plant species when a variety are encountered in a particular treatment area. While having additional herbicides available can allow for more target specific control, having one herbicide that controls a vast range of vegetation can be beneficial when an area is dominated by a variety of invasive broadleaved plants. In addition, adding a small amount of 2,4-D to a tank mix can often improve the effectiveness of the other herbicides and reduce the likelihood of a population developing herbicide resistance. The amount of 2,4-D used in combination with other herbicides would vary, based on these factors.
Dicamba	Dicamba has been used extensively on thistles and in combination with 2,4-D on perennial mustards (including whitetop) and knapweeds. Use would drop under the Proposed Action, and chlorsulfuron would be used for the majority of mustard treatments. However, dicamba provides control right up to seed set, which extends the treatment window.
Glyphosate	Glyphosate is used on broadleaf invasive plants and woody species and has been used to treat medusahead rye on the District. However, it is a non-selective herbicide and can harm desirable plants, so use has been limited to areas where this is an acceptable treatment. Glyphosate and 2,4-D have been the only two aquatic herbicides available to the District for the past 30 years, and their use would decrease if more herbicides labeled for use in aquatic and riparian / wetland situations became available.
Picloram	Picloram is effective on knapweeds, toadflax, Mediterranean sage, rush skeletonweed, leafy spurge, and thistles, and provides good residual control. Use would decrease under the Proposed Action, and clopyralid, which is more selective, would likely be used instead in most situations.

Herbicides available in the Proposed Action Only	
Chlorsulfuron	Chlorsulfuron is an ALS-inhibitor that is especially effective on broadleaf plants such as whitetop, perennial pepperweed, Mediterranean sage, and thistles. It is often mixed with 2,4-D to reduce the likelihood of developing plant resistance and to deter seed production. It can also be used on toadflax and houndstongue. Some grass species can be damaged by this herbicide, particularly wet meadow grass species such as meadow foxtail, some brome species, and timothy.
Clopyralid	Clopyralid targets many of the same species as picloram, but is more selective. It is particularly effective on knapweeds and Canada thistle, while minimizing risk to surrounding desirable brush, grass, and trees.
Imazapic	Imazapic, an ALS-inhibitor, is currently the most reasonable herbicide for treatment of invasive annual grasses such as cheatgrass and medusahead rye. It is selective for these grasses at low rates, leaving the perennial herbaceous species critical for restoration unharmed. Use of imazapic has occurred on the District in select locations since 2014

Source: Oregon FEIS, Appendix 9, pp. 629-648

CHAPTER III: AFFECTED ENVIRONMENT AND ENVIRONMENT CONSEQUENCES

This Environmental Consequences Section presents the potential changes to the environment resulting from implementation of the alternatives. This chapter describes all expected effects including direct, indirect and cumulative on resources from enacting the proposed alternative. An interdisciplinary team (IDT) has reviewed and identified issues and resources affected by the alternatives. Table 3.1 summarizes the results of that review. Those resources which were identified as being affected by actions in either alternative are noted in bold text.

Direct and indirect effects plus past actions become part of the cumulative effects analysis; therefore, use of these words may not appear. The Reasonably Foreseeable Future Actions (RFFAs) for the Bendire Project Area are: continued livestock grazing, weed treatments, road stabilization and maintenance, recreation activities and fire stabilization actions taken on federal, state and privately held lands, fuel reduction treatments and rights of way authorizations for utilities. Past actions and RFFAs vary under each resource because spatial and temporal scales address different variables such as wildlife set at a large scale versus upland vegetation set at a smaller scale where local management has a direct affect.

The affected environment for the Bendire ESR Project Area includes several actions which are in various stages of implementation under separate BLM Decision. These include small erosion control materials in-channel, sagebrush and bitterbrush plantings, and temporary fence construction for livestock grazing management to rest burned areas within pastures. These actions are considered a component of the cumulative effects analysis in the affect resources discussion below.

Table 3.1: Elements Affecting the Human Environment

Elements of the Human Environment	Status	If Not Affected, why? If Affected, Reference Applicable EA Chapter
Areas of Critical Environmental Concern (ACECs) and Research Natural Areas (RNAs)	**Affected**	**Analyzed in Chapter III Part 6**
Air Quality (Clean Air Act)	Not Affected	The alternatives do not impact air quality. Herbicide applications implemented with required design features, standard operating procedures and best management practices will be have no impact on air quality
American Indian Traditional Practices	**Affected**	**Analyzed in Chapter III, Part A.1**
Cultural Heritage	**Affected**	**Analyzed in Chapter III, Part A.2**
Environmental Justice (Executive Order 12898)	Not Affected	The Oregon FEIS analysis noted that the natural resources used for cultural or subsistence purposes would be adversely affected by the spread of invasive plants, which would be greater under the No Action Alternative (FEIS - USDI 2010a:333). Likewise, the FEIS analysis noted effects to economically or socially disadvantaged communities would be partially mitigated by treatment designs that attempt to minimize exposure of non-target food and water sources, and Standard Operating Procedures requiring consultation with tribes to locate any areas of vegetation that are significant to the tribes and that might be affected by herbicide treatments.
Farmlands (prime or unique)	Not Present	
Fire and Fuels Management	**Affected**	**Analyzed in Chapter III, Part A.12**
Flood Plain Management (Executive Order 11988)	Not Affected	According to the EO definition, floodplains are not an issue.
Grazing Management and Rangelands	**Affected**	**Analyzed in Chapter III, Part 3**

Elements of the Human Environment		Status	If Not Affected, why? If Affected, Reference Applicable EA Chapter
Hazardous or Solid Waste		Not Affected	Herbicide use, storage and application would be conducted according to SOPs, MMs, BMPs and Design Features as indicated in this Environmental Assessment and as incorporated from the Oregon FEIS and Western US PEIS. All implementation controls would be conducted according to herbicide labels and with required licensing.
Lands and Realty		Not Affected	Management actions considered will not impact land tenure or existing encumbrances.
Migratory Bird Treaty Act (Executive Order 13186)		**Affected**	**Analyzed in Chapter III, Part A.4**
Noxious Weeds (Executive Order 13112)		**Affected**	**Analyzed in Chapter III, Part A.5**
Paleontology		Not Affected	Field survey for Paleontological resources occurs during the Section 106 field reconnaissance. If fossils are encountered the requirements included in the Paleontological Resources Preservation Act (PRPA) of 2009, Title 43 CFR, Subpart 8200 and Manual 8270 will be implemented.
Recreation		Not Affected	The proposed action will not interfere with dispersed recreational activities. There are no developed sites that would be affected.
Riparian Zones, Wetlands, Water Quality (Executive Order 11990), and Fisheries		**Affected**	**Analyzed in Chapter III, Part A.7**
Social and Economic Values		**Affected**	**Analyzed in Chapter III, Part A.8**
Soils and Biological Soil Crusts (BSCs)		**Affected**	**Analyzed in Chapter III, Part A.9**
Special Status Species and Habitat	Wildlife	**Affected**	**Analyzed in Chapter III, Part A.4**
	Plants	Not Affected	Potential habitat would be identified within the treatment areas and would be surveyed during the appropriate season to document presence or absence. If Special Status plants are present design features will be used to protect the plants from adverse effects (see Project Design Features).
	Fish	**Affected**	**Analyzed in Chapter III, Part A.7**

Elements of the Human Environment		Status	If Not Affected, why? If Affected, Reference Applicable EA Chapter
Threatened or Endangered (T/E) Species or Habitat	Fish	Not Present	
	Wildlife	Not Present	
	Plants	Not Present	
Upland Vegetation		**Affected**	**Analyzed in Chapter III, Part A.11**
Visual Resources		Not Affected	There would not be any changes to the visual resource inventory or management classes.
Wild Horse and Burro		Not Present	
Wild and Scenic Rivers (WSRs) / Wilderness		Not Present	
Wilderness Study Areas		Not Affected	There are no actions proposed in the Beaver Creek Dam WSA which would impact wilderness character values.
Wilderness Characteristics		Not Affected	Less than 1 percent of the treatments occur in wilderness character units. The treatments will create a more natural appearance for wilderness character values.
Wildlife / Locally Important Species and Habitat		**Affected**	**Analyzed in Chapter III, Part A.4**

Elements of the Human Environment that are not present or not affected by the actions in either alternative are not addressed in the Affected Resources section which follows.

Project Area

The Bendire ESR Invasive Plant Management Project area for the alternatives in this Environmental Assessment is shown in Map 1 and is defined as the burned area plus small portions of included and immediately adjacent lands with high levels of known invasive annual grasses.

Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends. Reasonably foreseeable future actions are included in the analysis of cumulative

effects for each of the resources described below, as well as for the overall effects of the No Action and Proposed Action alternatives (see Summary Cumulative Effects section at the end of this Chapter). Analyzing foreseeable future actions provides important information on the anticipated cumulative effects into the future with all past and present actions.

Table 3.2 lists the Reasonably Foreseeable Future actions are pertinent to the Bendire Complex ESR Invasive Plant Management Plan.

Table 3.2: Reasonably Foreseeable Future Action in Vicinity of Bendire Complex

Project Name	Project Action	General Location	Timeframe
Oregon Greater Sage-Grouse RMP Amendments	Land Use Plan update	Oregon Sage-Grouse Habitat Districts in Eastern Oregon	On-Going
Bendire ESR Treatments (other than for invasive plants)	Shrub plantings, temporary livestock exclusion fencing, existing fence repair, soil stabilization, aerial seeding	Bendire Complex project area	On-Going
Northwest Malheur Sage-Grouse Restoration and Fuels Reduction	Fuels Treatments and Habitat Restoration	Northwest Malheur Resource Area	Environmental Assessment planned during FY2016
Bendire Complex ESR Actions (non-Herbicide)	Soil stabilization, fence repair and temporary construction, shrub plantings	Northwest Malheur Resource Area	Implementation FY2016-17
ORTELCO (Oregon Telephone Co.) Fiber Optic Line underground construction	Analyzing impacts	Northwest Malheur Resource Area	Application received
Sage-Grouse restoration on adjacent private lands	Funding supplied through Natural Resource Conservation Service funding	Northwest Malheur Resource Area	On-Going
Bully Creek Juniper Reduction	Juniper cutting and treatment	Northwest Malheur Resource Area	On-Going, as modified by Bendire Complex Fires.
Continued Recreational Access and Use	Public use of BLM-Administered Lands	District Wide	On-Going
Continued Livestock Grazing of BLM-Administered Lands	Public Land Grazing Authorizations	Project Area Wide	On-Going

Affected Resources

The Affected Resources section is organized by Resource and Resource Use. Each section below describes the existing condition of the resources in the Affected Environment, followed by the Environmental Effects of the Alternatives.

American Indian Traditional Practices

Affected Environment

The BLM is required to consider the effects of agency actions on cultural resources that are determined eligible or potentially eligible for the National Register of Historic Places (NRHP). The Secretary of Interior's Standards and Guidelines for Archaeology and Historic

Preservation are also an important element of management of cultural resources on public lands. Further laws that address various aspects of heritage resource management on BLM land include but are not limited to the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), the Antiquities Act, the Historic Sites Act, and the Archaeological Resource Protection Act (ARPA).

The Vale BLM District maintains government-to-government relations with numerous Native American tribes who have treaty reserved or Executive Order rights on the District. Tribal members use BLM lands to collect native plant species for a variety of cultural uses, such as food, medicine, dress, basketry, or ceremonial purposes. Consultation with the Burns Paiute Tribe has been initiated however this consultation has not resulted in the identification of any specific places within the Bendire Complex that have been designated as being important for traditional Indian land-uses. The Burns Paiute Tribe has expressed a concern regarding the population and distribution of culturally important plant species throughout the Malheur Resource Area of the Vale BLM District. Riparian areas along the North Fork of Bully Creek, Bully Creek, Clover Creek, North Fork Indian Creek, South Fork Indian Creek, Warm Springs and Willow Basin provide habitat suitable for hardwood shrubs of interest to the tribe such as chokecherry, willow, and quaking aspen. Upland areas with thin and rocky soils may support key edible species such as bitterroot or biscuitroot. Hunting marmot and other game species may occur throughout the burned area.

Characteristics of the natural environment that are important to Native American traditional use are topography, flora, and fauna. The three elements are closely related, with variations in topography-elevation, degree of slope, direction of exposure, and drainage pattern-having important effects on the distribution and abundance of plants and animals in any given locality. In general, areas that are topographically diverse, including both lowland and highland terrain, are also biotically diverse, and offer greater possibilities for human exploitation than do relatively more uniform landscapes (Aikens 1986).

Prehistorically, the Burns Paiute tribe knew their territory, available foods, and the environmental dynamics. The basic roots gathered for winter storage include camas bulb (kehmmes), bitterroot (thlee-tahn), khouse or cous (qawas), wild carrot (tsa-weetkh), wild potato (keh-keet), and other root crops. Fruit collected includes serviceberries, gooseberries, hawthorn berries, thorn berries, huckleberries, currants, elderberries, chokecherries, blackberries, raspberries, and wild strawberries. Other food gathered includes pine nuts, sunflower seeds, and black moss.

While the tribe no longer relies upon the traditional collection and processing of plants for food, fiber, and medicine for their existence, they still consider the preservation of these plants, their use in ceremonies, and the knowledge that they exist to be important to the maintenance of their cultural heritage. Plants are mostly used today in cultural ceremonies, special occasions, for medication, and for the perpetuation of cultural traditions within families. Great concern is expressed for the preservation of important plant areas and plant types. Resulting from tribal confidentiality concerns, the BLM is not aware of how often plants are collected or where, strong indications are given that this is done on a regular basis. Invasive plants, exclusion of fire, effects from resource extraction, road building, and other

factors have contributed to declines and dislocations in many of the plant species important to tribes within the region.

Environmental Consequences

Common to Both Alternatives
When a vegetation treatment project is proposed, the 2015 Oregon BLM/SHPO Protocol would be researched for applicability. If the proposed treatment is not identified in the protocol, cultural survey needs would be determined and survey would be completed prior to vegetation treatments. The survey would assess the
proposed treatments in conjunction with the effects on cultural resources prior to any ground disturbing activities.

Proposed vegetation treatments were divided into two groups for cultural resource management purposes; these include ground disturbing and non-ground disturbing actions (Table 3.3).

Table 3.3: Ground Disturbing/Non-Ground Disturbing

Ground Disturbing Actions	Non-Ground Disturbing Actions
Staging Areas for Aerial Spraying (Proposed Action)	Herbicide Application (Proposed Action)

Cultural survey needs would be determined for all ground-disturbing actions.

The Non-Ground Disturbing Actions are considered "exempt" from field survey and further review as identified in the 2015 State Protocol[4] between the Oregon-Washington BLM and the Oregon State Historic Preservation Officer (SHPO). Appendix E of the State Protocol identifies specific projects or activities that are exempt from field survey and consultation with SHPO. The items pertaining to vegetation management are located in Range Management Program, which state:

> Item 1. "Vegetation treatment by spraying, permit issuance and aerial seeding of grasses. However, the effects of vegetation treatment by spraying upon traditional food resources will be considered through other analyses (NEPA and/or Land Use Plans)
>
> Item 4. Herbicide application where it would be unlikely to affect rock art images or traditional Native American plant gathering areas as determined in consultation with affected tribes."

Treatment areas particularly those associated with small, new populations would be treated in late April through July. Most edible plant gathering occurs in May through mid-June so conflicts may occur for a brief period. Effects to non-target plants could occur, but would be limited because sprays are directed at the target plants; nearby native species would

[4] This environmental assessment meets the requirements of analysis referenced in the Protocol.

repopulate the site. Survey areas, and treatments planned on established sites would be identified on the Annual Treatment Plan, and coordination with the Tribes would decide if conflicting treatments can be rescheduled or treatment areas need to be posted so people can avoid them.

Table 3.4: Effects of Herbicides (Native American)

Herbicides available under the No Action Alternative	
2,4-D	2,4-D has a low risk for direct spray, to a child, at the maximum rate. A Mitigation Measure precludes use of the maximum rate where feasible.
Dicamba	EPA classifies Dicamba as toxicity class III (low toxicity) with the signal word CAUTION. A Mitigation Measure precludes use of the maximum rate where feasible.
Glyphosate	Glyphosate has a low risk for consumption of contaminated water, to a child, at the maximum rate. No maximum rate treatments are anticipated.
Picloram	EPA classifies Picloram as toxicity class II (moderate toxicity) with a signal word of WARNING. A Mitigation Measure precludes use of the maximum rate where feasible.
Herbicides available under the Proposed Action Alternative	
2,4-D	2,4-D has a low risk for direct spray, to a child, at the maximum rate. A Mitigation Measure precludes use of the maximum rate where feasible.
Chlorsulfuron	EPA classifies chlorsulfuron as toxicity class III (low toxicity). Chlorsulfuron has low toxicity if individuals accidentally eat, touch, or inhale residues. A Mitigation Measure precludes use of the maximum rate where feasible.
Clopyralid	EPA classifies Transline as toxicity class III (low toxicity) with a signal word of CAUTION. A Mitigation Measure precludes use of the maximum rate where feasible.
Dicamba	EPA classifies Dicamba as toxicity class III (low toxicity) with the signal word CAUTION. A Mitigation Measure precludes use of the maximum rate where feasible.
Glyphosate	Glyphosate has a low risk for consumption of contaminated water, to a child, at the maximum rate. No maximum rate treatments are anticipated.
Imazapic	Imazapic has very low toxicity if individuals accidentally eat, touch, or inhale residues. A Mitigation Measure precludes use of the maximum rate where feasible.
Picloram	EPA classifies Picloram as toxicity class II (moderate toxicity) with a signal word of WARNING. A Mitigation Measure precludes use of the maximum rate where feasible.

"Caution", "Warning" and "Danger" are signal words used to denote the level of toxicity for herbicides according to EPA standards. One of the three following terms is found on the label and can be interpreted as:

Caution: Low toxicity: lethal dose is an ounce to more than a pint.
Warning: Moderately toxic: lethal dose is a teaspoon to a tablespoon.
Danger: Highly toxic: lethal dose is a few drops to a teaspoon.

Alternative A: No Action

Approximately 35 acres of noxious weeds are known to exist in the Bendire Wildfire Complex Project Area. It is estimated that an additional 35-65 acres of these species are also likely to be present. Monitoring would be conducted over the 5-10 year period. The use of four herbicides: 2,4-D, dicamba, glyphosate and picloram (Table 2.2 Herbicide Application) would be limited to federally or state listed noxious weed species. Treatments on invasive annual grasses would not occur; invasive annual grasses (particularly medusahead rye) are the greatest threat to edible root species because they prefer similar soil sediment types.

Alternative B: Proposed Action

The Proposed Action is similar to the No Action Alternative except it is expanded to allow herbicide use on all invasive plants (not just noxious weeds), and it is expanded to include the use of seven herbicides rather than four. Allowing the ability to treat all invasive plants and

the inclusion of herbicides selective to invasive annual grasses greatly increases the number of acres by 30,000 that could be effectively treated under this alternative.

An herbicide-by-herbicide discussion of their potential to harm non-target plants is included in the Native Vegetation section in this Chapter and Table 2.2 - Herbicide Information. Herbicides are designed to kill plants, so culturally significant plants could be damaged or killed if sprayed with any of the herbicides to which they are susceptible. Imazapic treatments could contaminate pre- and post-emergent fungi, but there is no potential human health effect from such contamination as identified in the Human Health Risk Assessments from the Oregon FEIS (USDI, 2010) Appendix 8:605-608 and Appendix 13:799-822), as incorporated from the 17 Western States PEIS.

Cultural Heritage

Affected Environment

Please refer to the Affected Environment in Section 1) above for American Indian Traditional Practice).

Prehistory

The APE is located within the historic territory of the Burns Paiute Tribe; they have asserted their long-established presence in this region and continue to use the surrounding landscape for subsistence, economic, and spiritual practices.

Harney Valley Paiute populations continued a hunting and gathering lifestyle into the 19th century incorporating seasonal exploitation of faunal and vegetative resources. Winter encampments by Malheur Lake disbanded in spring and a move to the spring root collection camps. During the spring root harvest individuals gathered together into groups of up to 100 people. The spring root gathering in the Malheur River was not limited to Paiute groups and tribal members from the Columbia Plateau also participated in the harvest. Men also traveled to the headwaters of the Malheur River to fish for spawning salmon. Summer exploitation of crickets and marmots gave way to hunting elk and small game in the fall. Seed and berry collection occurred during late fall leading tonto deer and antelope hunts and rabbit drives before groups settled into well-established winter camps near reliable water sources (Aikens 1993).

In 1872 president Ulysses S. Grant issued an executive order setting aside 1.8 million acres as the Malheur Indian Reservation (Allen 2005, Nielsen 1987:41). In 1875 approximately 700 Paiute and Bannock lived on the reservation. The reservation lasted until 1878 when a conflict ensued between a group of Bannock, who allied themselves with a number of local Paiute, and local white settlers who were encroaching on the reservation. The “Bannock War” resulted in the dissolution of the reservation and the removal of the native occupants to the Yakima Reservation in Washington (Allen 2005).

History
General historic information for Malheur County can be found in “Malheur County Historical Society Vol.11”. The following is only a brief discussion on the history pertinent to the analysis area.

British and American trappers penetrated the Northern Great Basin early in the nineteenth century providing important information about the country and the indigious peoples encoutered along the route that became the Oregon Trail.

The first recorded major entry of Euro-Americans into the agency valley area occurred in 1845 as part of the larger overland migration to Oregon. The portion of the Oregon Trail through the Blue Mountains and along the Columbia River to The Dalles was known to be grueling and dangerous. In 1845, about 1,200 men, women, and children in over two hundred wagons accepted fur trapper and guide Stephen Meek's offer to lead them on a shortcut across the trackless high desert of eastern Oregon. Those who followed Meek experienced a terrible ordeal when his memory of the terrain apparently failed; lost for weeks with little or no water and a shortage of food, the “Overlanders” encountered deep dust, alkali lakes, and steep, rocky terrain. Many became ill, and some died in the forty days it took to travel from the Snake River in present-day Idaho to the Deschutes River near Bend, Oregon.

Meek led the party though Harper Valley and the Malheur Mountains and then onward to the north fork of the Malheur River near the present day Beluah Reservoir. From Castle Rock, a prominent geologic feature of the area’s landscape north of the reservoir, the group moved west only as fast as the oxen could go. The rocky ground cut and bruised the animals’ feet. Historian Donna Wojick noted that, “Stones frequently broken by a forward company, iron-stained by wagon wheels and bloodstained by cattle, left a vivid trail for companies to follow.”

Just south of Castle Rock, Sarah Chambers (an emigrant in the party) succumbed to “camp fever”. Her husband Rowland and the rest of the party marked her passing on a large stone “Mrs. S. Chambers Sept. 3rd 1845” Hers was the first death among those following Meek, many others succumbed in the weeks that follow.

Prospectors continued to use parts of Meek’s route in the 1860 to access mines at Malheur City, Mormon Basin, Rye Valley, Auburn, and Baker. The establishment of the Malheur Indian reservation in 1872 prompted the construction of a road to the reservation from Fort Harney. The original buildings for the Malheur Agency were located near the current northwest tip of the reservoir, while the town of Beluah was located near the east end of the Agency Valley Dam. Settlement in the area by both Native and Euro-American farmers and ranchers increased in the 1870s into the 1880s (Nielson 1987).

After the “Bannock War” the land set aside as the Malheur Reservation was returned to the public domain and offered for sale at public auction in May 1883. The agency valley provided a choice spot for cattle ranching and irrigated hay fields. Tom Overfelt, the partner of Henry Miller, a cattle ranching baron from California with interests in Oregon, purchased the land to expand Miller’s farming and ranching empire (Nielson 1987:44). In 1927,

Marcheck Ranches acquired Henry Miller's holdings in the agency valley. Marcheck Ranches, Inc. continues to cultivate hay and raise beef cattle.

The Ontario to Burns Road was a major component of a larger network operating on the eastern side of Malheur County during the late 1890's and early 1900's. Most of the freight coming into Burns came from Huntington or Ontario. This transportation network required periodic way stations along the route approximately every 25 miles. This pattern reflected the normal range for horses pulling wagons laden with goods and passengers over difficult terrain, often in inclement weather. Freighters and their horse teams could not be expected to endure more than 18 to 20 hours of rigorous travel, therefore; overnight accommodations and horse changes were imperative at regular intervals. The traveler was expected to continue non-stop to his destination, with rest stops, the freighters had accommodations along the route where folks could bunk.

The journey from Ontario to Burns took approximately forty hours, depending on conditions. The stage stops and horse change stations that included, in the early 1900's, from east to west: Ontario, O'Neil's Hot Springs, Kate Phoefpian, Dick Scott's at Beulah, Stallard, Williams, George Gates on Stinkwater Creek, George Buchanan, Harney City, and Burns. The George Buchanan stop was later shifted to Joe Buchanan's place (his brothers), just east of present day Buchanan. Some of these stations were just for changing horse teams, such as O'Neil's Hot Spring, Arnold, and William's stops. The mail contracts provided a steady income for the stage operators, but it was the passengers and freight that generated the extra revenue. In 1883 the railroad reached the Ontario area, with a branch line to rail established in 1907. From 1884 to 1924 supplies reached the town by freight wagon via the Ontario to Burns Road (Neilson 1987:41).

The present day road follows much of the original Burns-Vale Road and the freight route. The current road separates from the Burns-Vale road for a half mile near Mud Springs Gulch and on the upper section of grade above Beluah reservoir. Near the Hunter Ranch, the original Burns-Vale Road towards Westfall and the later freight route split, with the freight route taking a more direct route towards Westfall. Along the freight road, Kate and William Phoefpian had a stage station. The state station is likely Hanna Station, which is located on the north fork of Indian Creek 13 miles west of Westfall. Meek's cutoff lies a few miles south of the freight road (Neilson 1985).

Environmental Consequences

The BLM's Invasive Plant Management Program identifies non-native species spread standards, policies and direction that shall be adhered to under both alternatives to minimize, prevent, and detect new infestations.

All other factors being equal, the Alternative A has a higher potential for introduction and spread of invasive non-native species because of the limited amount of herbicides allowed.

The Proposed Action Alternative B has a lower potential for introduction and spread of invasive nonnative species populations because of the additional herbicides that are available for use.

Benefits from an aggressive invasive plant management program include:

- A decrease in the spread of invasive plants degrading the existing native plant gathering areas.
- A decrease in the spread of invasive plants from the BLM to Tribal trust lands and adjacent private property.
- In the long-term, without aggressive vegetation management methods, invasive plants populations may threaten to take over traditional gathering areas. No adverse human health effects are anticipated.

Alternative A: No Action

Direct and Indirect Effects of Alternative A

The No Action Alternative would not directly adversely affect the existing condition of cultural resources within the District. However, indirectly, without the use of the additional 3 herbicides, fewer invasive plant infestations would be effectively controlled. The root structures of non-native vegetation are less suitable to hold soils in place (Lacey et al. 1989), thus moderately increasing surface erosion processes in comparison with the stabilizing root masses of native vegetation. Expected erosion processes moderately affect buried cultural material by increasing artifact exposure, facilitating illegal collection and theft. Native American gathering areas are at greater risk of spread from invasive plants under the No Action Alternative than the Proposed Action because of the limited approved herbicides available.

Cumulative Effects of Alternative A

Future wildfire effects, ongoing grazing, roads, recreation and other BLM activities in combination with the No-Action Alternative would; over the short-term (0-3 years)result in a minor increase of overland erosion until the establishment of a vegetative soil cover and intact root masses on cultural resource sites. Over the long term (3+ years), a decrease in noxious weed establishment and encroachment areas would reduce soil erosion disturbance levels.

Alternative B: Proposed Action

The Proposed Action has been identified as the preferred action alternative from a cultural standpoint. The project design features identified in Alternative B include management requirements that will adequately protect surface cultural resources.

The decrease of existing non-native vegetation areas and the increase in native vegetation root masses would have beneficial effects to the subsurface components. The higher rate of effective invasive plant management containment, control, and/or eradication of invasive plants anticipated with the Proposed Action supports the protection of culturally significant plant areas by reducing the encroachment of invasive plants and grasses. The Proposed Action would include Standard Operating Procedures, Mitigation Measures, and Project Design Features that are designed to avoid any major direct and indirect effects on cultural resources.

Direct short-term (0-3 years) effects may occur from the ground disturbing activity (Aerial Support Staging Areas) identified in the Ground Disturbing/Non-Ground Disturbing Table 3.3. Efforts would be made to disturb as little of the area as possible because ground disturbance encourages re-infestation or the germination of on-site seeds. The surface disturbance associated with heavy equipment, helicopter use and general vehicle use could cause a minor, adverse short-term effects, post use reclamation is in the Helicopter mitigations. If cultural resources were encountered, appropriate regulations and mitigations would be followed.

Indirect effects resulting from the Proposed Action would increase acreage of native vegetative ground cover in the long term, improving the associated soil stability and erosion potential while reducing artifact exposure and theft. Broad-scale herbicide application for medusahead rye and cheatgrass could affect large areas; a project design feature in this EA is to notify the tribes of such proposals and coordinate with them to avoid conflicts where possible.

The proposed monitoring activities will not directly or indirectly affect any eligible or potentially eligible cultural sites.

Indirect effects from the proposed re-vegetation and invasive and noxious weed treatment activities at all aerial support areas would benefit cultural resource management by establishing an adequate vegetative cover that will decrease artifact exposure, illegal collection and theft.

Cumulative Effects of Alternative B

Prior to the development of BLM's Cultural manuals in 1976; adverse effects to cultural resources from livestock grazing, irrigation/spring developments, road/trail construction, along with recreational developments occurred with little analysis of the detrimental impacts on cultural resources. Historically, minimal effort was made to regulate the private collection of historic and prehistoric artifacts on BLM lands, the losses of cultural resource artifacts and subsequent scientific information is considered major in certain locations. The adoption and enforcement of federal cultural resource protection legislation and regulations over the past 40 years has reduced the rate of cultural resource deterioration on Federal lands.

Cumulatively: the historic effects previously discussed: the current proposal, wildfire effects, ongoing grazing, roads, recreation and other BLM activities in combination with the proposed-action Alternative B would; over the short-term (0-3 years) result in a decrease of overland erosion because of the establishment of a vegetative soil cover and intact root masses on cultural resource sites. Over the long term (3+ years), a decrease in noxious weed establishment and encroachment areas will further reduce soil erosion disturbance levels.

Grazing Management and Rangelands

Affected Environment

The Bendire Complex burned through seven allotments, containing 41 pastures, and affecting seven Permittees. A maximum of 31,712 permitted Animal Unit Months (AUM)s were affected by the Bendire Complex. Allotments within the project area generally have a 4/1-10/31 permitted grazing season, and are divided, via fencing, into smaller pastures with either a rest rotation or deferred grazing rotation grazing system as part of their Allotment Management Plan (AMP). Terms & Conditions that require livestock operators to meet and maintain resource objectives such as upland utilization limits, riparian stubble height requirements, and limitations on the use levels of willows and other woody species are included in the term grazing permits. These terms & conditions along with the associated grazing systems were designed, implemented, and have assisted in the recovery of rangeland vegetation from the historically unmanaged grazing practices once prevalent in the area.

Table 3.5: Allotments and Acres Affected by Bendire Complex Fires

Allotment Name	Number of Affected Permittees	BLM Acres Burned	BLM acres Burned (%)	BLM AUMS in Allotment
Allotment No.3	1	3,478.22	7.01	10,392
Clover Creek Individual	1	321.77	0.65	248
Dearmond Murphy	1	11,319.58	22.81	6,153
Lava Ridge	1	4,556.36	9.18	1,722
Rail Canyon	1	1,376.46	2.77	3,023
Richie Flat	1	4,813.81	9.70	3,168
Willow Basin	1	15,984.29	32.21	7,006
Totals	**7**			**31,712**

Vegetative communities within the project area are generally dominated by big sagebrush mixed with bluebunch wheatgrass and Idaho fescue with a component of bottlebrush squirreltail. Western Juniper is scattered throughout the burn area. Burn severity on bunchgrasses and sagebrush were estimated to be low to moderate with the exception of the thicker areas of juniper where heat was steady and prolonged or where the fire was terrain driven, such as in canyon type areas where terrain effectively captures the heat of the fire and concentrates it, or where fire is provided a gradient and unrestrained opportunity to run uphill creating heat and mortality in excess of normal fire behavior. The fire activity was flashy and wind driven in most areas with a resulting mosaic of extensive burned areas and intermixed unburned islands. There were some areas of residual standing stems of sagebrush and unburned bunchgrass root crowns.

Shortly after the Bendire Fire, areas were mapped to document fire intensity and burn severity. Areas deemed most at risk of invasion were selected and, as weather permitted, a portion of the area was treated (October, 2015) with an aerial imazapic application to inhibit invasive annual grass growth potential and expansion per the Bendire ESR Treatment Decision dated

October 26, 2015. Additionally, aerial seeding and sagebrush plantings are in varying stages of implementation focusing on those areas of greatest burn severity.

BLM is in the process of determining the length of grazing closures as well as objectives to be met prior to livestock resuming in the burned areas. Verbal agreements have been made between the BLM and Permittees to rest pastures where over 50% of the pasture had burned, until monitoring and conditions indicate resources have recovered. A decision to construct temporary fencing was issued on February 29, 2016 which will allow infrastructure to separate the burned and unburned areas within certain pastures and assist in protecting areas seeded and planted. This fencing will lessen the potential for additional disturbance within the burned area from livestock grazing and to facilitate recovery. Although additional disturbance may be limited, the opportunity for invasive annual grasses to gain dominance is still present, depending on vegetative resilience of the site and fire severity.

There are a number of roads and trails, both within and adjacent to, the fire area that are used for access by local landowners, Permittees, hunters, and other recreational users. Many of these roads are adjacent or through both known and unknown infestations of invasive annual grasses and noxious weeds, becoming a vector for seed translocation.

Cheatgrass and medusahead are a component of the vegetation in portions of the burned area at lower elevations, particularly near main roads. Higher elevation areas have a component of cheatgrass and medusahead; it is generally a smaller percentage of the vegetation. Ventenata is a more recently introduced invasive annual grass with small sites being found in all elevations. Due to the severity of the fire there is currently a greater opportunity for invasive annual grasses to gain a foothold and increase in density.

Weeds and annual grasses often have little forage value and are commonly unpalatable to livestock and wildlife. While cheatgrass has nutritive value and is palatable before seed ripe, forage value diminishes quickly following seed ripe. Medusahead is a poor forage species for both livestock and wildlife and has low palatability because of its high silica content. Ventenata has high silica content, also, and provides even poorer forage for wildlife and livestock. Medusahead is known to exist within large portions of the Bendire Complex project area on the western 1/4, the rest of the area contains low to moderate levels of infestation, as well as on other adjacent ownerships at low to high densities, and the potential for invasion exists from roadways and other nearby sources. Annual grasses have also been shown to greatly increase fine fuels and shorten the fire return interval. Therefore, they increase the overall amount of time needed for recovery of the site.

Environmental Consequences

Alternative A: No Action

Under the no action alternative annual invasive grasses would be left untreated and would continue to spread throughout the Bendire Fire and adjacent areas, creating a loss of forage for ungulates and important sagebrush habitat. Although livestock may graze cheatgrass early during the spring and later in the fall, the main forage base for ungulates is based upon desirable perennial grasses. Although aerial seeding was implemented to assist emergency

stabilization of soils and slow the continued spread of invasive annual grasses, seeding only is insufficient to prevent future spread without providing the seeding opportunity to outcompete the annuals through herbicide application. Without herbicide application on invasive annual grasses, the preferred forage base for livestock and wildlife would continue to decrease. Existing authorized herbicide treatments for noxious weeds only would continue.

Without imazapic treatments to control invasive annual grasses these species may become dominant on the site. Noxious weed treatments of broadleaved species would continue using the less effective herbicides currently authorized under the existing Vale District Five Year Integrated Weed Control Plan EA. Selected small sites of invasive annual grasses, also listed as noxious, could be spot treated by ground methods.

Invasive annual grasses such as cheatgrass, ventenata, and medusahead would increase in abundance and density after fire, resulting in increased fine and ladder fuels, creating a receptive environment for future fires and an increased seed bank for these species. As invasive annual grasses continue to invade and increase, the fire frequency increases, reducing the ability of desirable native perennial grasses, forbs and shrubs to re-establish after fire eventually eliminating most of the native shrubs and trees from the landscape, resulting in an increasingly less productive and degraded landscape. Additionally the invasive annual grasses are winter annuals capable of growing earlier in the season thus outcompeting other species and depleting available soil moisture prior to native species coming out of seasonal dormancy.

Alternative B: Proposed Action

Under the proposed action, spraying to control invasive annual grasses would inhibit their potential for growth in the spring. The available nutrients and soil moisture the invasives generally utilize would then become available for the native and desired species to pull upon and assist in fire recovery. Additionally, there would be nutrients and spacing available to sustain seedlings of desired vegetation that are anticipated to present themselves post-fire, facilitating range conditions to improve. Forage availability for wildlife and livestock within the burned area would return to pre-fire levels, and potentially increase over time, as noxious weeds and annual grasses are controlled.

Other than imazapic, which mainly targets annual grasses and weedy annual forbs, especially mustards, at the proposed 6 oz. rate, 5 of the remaining 6 herbicides proposed in Alternative B are selective to broadleaved plants, which are only consumed incidentally by cattle. These are 2,4-D, dicamba, picloram, clopyralid and chlorsulfuron. The remaining herbicide, glyphosate, is non-selective and can control both broadleaved and grass species. To mitigate off-target damage, glyphosate would be directionally spot sprayed on select sites or could be used on monocultures of invasive grasses and/or weedy and noxious broadleaved plants on small sites where there are no desirable plants. Over time, broadleaf invasive plants would be replaced by native perennial grass species more palatable to cattle, which would result in negligible, beneficial effects. Imazapic is readily absorbed through leaves, stems, and roots of the invasive annual grasses, and is then translocated rapidly throughout the plant, where it accumulates in the meristematic regions. Treated plants stop growing soon afterwards. (Tu et al. 2004) Uptake by roots occurs as seeds germinate, seedlings then stop growing, turn yellow

and die. As directed by the SEORMP following wildfire livestock will be removed from the areas prior to treatments and not allowed to return until monitoring indicates the resource conditions and objectives are met; therefore, the opportunity for consumption of vegetation containing herbicide is minimal.

In the allotments affected by the Bendire Fire, grazing schedules and rotations will continue to be followed for those pastures outside the project area. Grazing will return to those where livestock were removed, as monitoring indicates objectives and resource conditions have been achieved. Continued use of grazing as a tool to move towards desired resource conditions will occur, as recent research suggests properly managed livestock grazing is an effective tool that can be used to maintain healthy plant communities while reducing vegetative impacts resulting from wildfires (Davies et al. 2010; Patton et al. 2007).

Cumulative Effects

The Cumulative Effects Analysis Area (CEAA) for grazing management and rangelands is performed at the allotment level. Past, present and reasonably foreseeable future foreseeable activities within the area include:

> Past Actions: Historic grazing, juniper cuts for fuels reduction, Vale Project seedings & chemical applications (2, 4-D), Bonita & Ironside fires (2012), and 2015 Imazapic treatment and treatment of noxious weeds immediately following the Bendire Fire.
>
> Present Actions: Managed livestock grazing, temporary fencing, sagebrush seedings, bitterbrush and squaw apple plantings, aspen exclosures, straw waddles for erosion control, noxious weed treatments, hunting, recreational activities and road maintenance.
>
> Future Foreseeable Actions: NW Malheur Fuels Reduction Project, ORTELCO fiber optic line, BLM Bully Creek juniper fuels treatments, NRCS Bully Creek juniper fuels treatments on private lands, and continued grazing.

Future fuels treatments and juniper cuts will have a net beneficial impact on livestock grazing by reducing fuels. A reduction in fuels will help reduce the fire return interval and severity, directly reducing future mortality on desired perennial vegetation. It is anticipated that with the reduction in fuels, future fires occurring in these areas will be easier to contain, thus resulting in smaller acreages burned, greater land health and resiliency, and less forage lost.

Linear easements and rights of way for future utilities (ORTELCO) contain BMPs that directly address monitoring and treatment for noxious weeds. Impact to livestock grazing and rangelands in the form of vegetation and forage loss will be insignificant.

Historic and unmanaged livestock grazing occurred on the Vale District for decades and has resulted in changes in plant communities in the sagebrush steppe. Although grazing has a direct effect on herbaceous plants through selective cropping of palatable plants, trampling, deposition of urine and feces, and soil compaction, management is applied to facilitate meeting the Standards for Rangeland Health. These standards were last evaluated in the Bully

Creek and N. Fork Malheur watersheds in 2000 & 2007 respectively. Changes in season of use were implemented to assist in making substantial progress towards meeting the required standards for rangeland health. Past and reasonably foreseeable future actions that continue to evaluate conditions of the rangeland, and base changes in management on land health, are expected to result in long-term beneficial effects to native vegetation.

All of the past and present actions have combined to become the conditions described in the affected environment section. When combined with the Reasonably Foreseeable Future actions there could be a short term negative affect to livestock management if, after the treatments, it is necessary to remove livestock until monitoring indicates objectives are met. Invasive annual grass and noxious weed monitoring mandated through design features for future actions, combined with additional project funding sources for EDRR, would provide a net benefit to grazing management and rangelands as they would become healthier, resilient, and more productive vegetative communities.

Wildlife, Special Status Species (Wildlife), and Migratory Birds

Affected Environment

Wildlife

Collectively, a large number of wildlife species could utilize suitable habitat in the affected area on a seasonal or yearlong basis. There are many mammal species, and several reptile and amphibian species that can typically be found in sagebrush habitats, grasslands, and riparian areas within the affected area.

The Bendire Complex fire eliminated nearly all wildlife habitats within the perimeter, with the exception of a few small islands of vegetation that did not burn. Wildlife such as mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), and other ungulates in the area may utilize these small islands, edges of the burn perimeter, and areas adjacent to water sources in search of forage, but most ungulates were displaced by the nearly complete loss of vegetation in the burned area. Ungulates and many other generalist and grassland adapted wildlife species would be expected to be able to return the following spring as grasses and other herbaceous plants quickly recover to provide suitable habitat. Vegetation mortality represents only a temporary loss of cover and forage. A portion of this habitat would re-sprout and/or regenerate from the seed bank or plants that survived in areas where fire burn intensity was low. Many wildlife species, including mule deer and pronghorn, would be expected to gain some temporary benefit from the fires due to increased forage from higher proportions of grass and forb cover in burned areas. Sagebrush vegetation would be expected to require several decades or more to recover to the point where it once again provides adequate structure and diversity to provide thermal and hiding cover to various wildlife species that once inhabited the area. Two factors may limit small mammal populations after fire: 1) the loss of shrub cover may result in increased predation, and 2) thick stands of cheatgrass may impede small mammal movements which may affect breeding success and population size (Groves & Steenhof 1988). Because cheatgrass-dominated communities support fewer small mammals than shrub-dominated communities, predator species such as

the gopher snake, coyote, badger, and raptorial birds are also affected by large-scale losses of shrub habitat (Gano & Rickart 1982, Kochert et al. 1999).

Mule deer are widespread throughout the fire and surrounding area; approximately 1,683 acres of mule deer habitat burned in the fire. The affected area provided both winter and summer range. The availability of winter range is a critical limiting factor for the affected mule deer herds. . Elk also use the project area on a more limited basis in winter.

Pollinators

Pollinators can include hummingbirds and bats, but insects make up the vast majority of pollinators. Ground nesting bees (both solitary bees and bumblebees) are likely to be the most important pollinators in grasslands, but flies, beetles and butterflies are also prevalent. Pollinators are essential for rangeland food production, help with nutrient cycling, and are prey for many birds. Diversity of plant habitat is essential for supporting a variety of pollinators since many pollinators are specialists in terms of the plants they visit. Pollinators are not entirely averse to nonnative plants, especially certain flowering species such as saltcedar or thistles. However, most invasive annual grasses and forbs (such as cheatgrass and whitetop) do not seem to attract many native pollinators (Cane 2011).

Special Status Wildlife

There are no known federally Threatened or Endangered species or federally designated Critical Habitat found within or in the vicinity of the Bendire Complex (project area). The U.S. Fish and Wildlife determined that Greater Sage-Grouse (*Centrocercus urophasianus*) are "not warranted at this time" (80 FR 191, p 59858-59942). Greater sage-grouse (*hereafter* sage-grouse or GRSG) are managed under the BLM Special Status Species (SSS) direction guidance. The BLM guidance is to conserve this species and its habitat and shall ensure that actions authorized, funded, or carried out by the BLM do not contribute to the need for the species to become listed.

Several SSS occur or have potential habitat that was impacted by the wildfire and is in the project area, but only greater sage-grouse, a sagebrush obligate species, has documented occurrences and substantial acres of habitat lost due to the wildfire. Columbia spotted frogs (CSF) and pygmy rabbits have potential habitat within the fire perimeter; however, the most recent record for CSF dates back to 1994. Due to the lack of sightings or negligible potential impact to their habitat, there would be no measurable effects to individuals or populations of pygmy rabbits or CSF and will not be carried forward in the analysis.

Pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), fringed myotis (*Myotis thysanodes*), and spotted bat (*Euderma maculatum*) are other SSS potentially occurring in the project area. However, these bat species have not been documented in the area, are not as strongly associated or solely dependent on sagebrush habitat, and typically roost in areas that are protected from fire. Additionally, these bat species are primarily active only at night, migrate out of the area in the fall, or some individuals may remain and hibernate through the winter; (Verts and Carraway 1998);

therefore, SSS bats are not expected to be affected by the project and are not carried through for detailed analysis.

The fire area is currently occupied Greater Sage-Grouse habitat and the entire area burned (49,628 acres) is designated as a Priority Habitat Management Area (PHMA) for sage-grouse. Ten sage-grouse leks are present within the burn perimeter; seven active, three historic/unoccupied. Two additional leks are outside of the burn area, but within the project boundary. Sagebrush is a critical habitat component for sage-grouse, especially in the winter when sagebrush constitutes more than 90% of their diet (Hagen 2011), (Weiss and Verts 1984). A few small, unburned "islands" of sagebrush within the fire perimeter may provide short-term refugia for some individuals, but the wildfire killed the vast majority of sagebrush plants. The burned area now provides virtually no cover and forage for this species. Most individuals that survived the fire and avoided predation immediately after the fire have been displaced into sagebrush steppe outside the fire perimeter. Sage-grouse may find limited forage near the edge of the fire, but most individuals are expected to avoid the area, especially during the winter months, until the sagebrush recovers to the extent it once again provides adequate hiding cover and forage. Sage-grouse have been observed returning to leks in burned areas in subsequent seasons, but the size of the area burned in the Bendire Complex fire and distance to sagebrush cover would be expected to diminish or possibly eliminate use of existing leks in the burned area for several years or decades.

The "Greater Sage-Grouse Conservation Assessment and Strategy for Oregon" (Strategy, Hagen 2011) has an action item to "Reduce negative impacts of wildfire on sage-grouse through prompt and appropriate habitat reclamation or rehabilitation." The Strategy recognizes the need for prompt and appropriate rehabilitation following a wildfire to prevent additional threats and damage to sage-grouse habitat and has the following conservation guideline regarding invasive annual grasses from Page 101:

> *If cheatgrass or other exotic plant species are present before a fire occurs, they are likely to become more dominant post-fire if the area is not properly rehabilitated. Rehabilitation techniques that decrease the probability of cheatgrass invasion are needed.*

In addition, as part of the ARMPA, the BLM developed vegetation management objectives, such as those for managing invasive plant species in GRSG habitats. Specific goals and objectives related to invasive annual grasses on page 2-10 include:

> *Goal VEG 1: Increase the resistance of Greater Sage-grouse habitat to invasive annual grasses and the resiliency of Greater Sage-grouse habitat to disturbances such as fire and climate change to reduce habitat loss and fragmentation.*
>
> *Goal VEG 3: Use integrated vegetation management to control, suppress, and eradicate invasive plant species per BLM Handbook H-1740-2. Apply ecologically based invasive plant management principles in developing responses to invasive plant species.*

Objective VEG 3: Reduce the area dominated by invasive annual grasses to no more than 5 percent within 4.0 miles of all occupied or pending leks. Manage vegetation to retain resistance to invasion where invasive annual grasses dominate less than 5 percent of the area within 4.0 miles of such leks.

These excerpts are not inclusive of all guidelines in the ARMPA, but are the most pertinent to this document.

Migratory Birds

The sagebrush steppe prior to the wildfire supported several species of sagebrush obligate and facultative migratory birds, including sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza belli*), Brewer's sparrow (*Spizella breweri*), and loggerhead shrike (*Lanius ludovicianus*). Other species commonly occurring in sagebrush habitat in the area include mountain bluebird (*Sialia currucoides*), vesper sparrow (*Pooecetes gramineus*), horned lark (*Eremophila alpestris*) and western meadowlark (*Sturnella neglecta*). Bird species associated with western juniper include gray flycatcher (*Empidonax wrightii*), dusky flycatcher (*Empidonax oberholseri*), northern flicker (*Colaptes auratus*), and American robin (*Turdus migratorius*). Raptors found in or near the project area include golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), long-eared owl (*Asio otus*) and short-eared owl (*Asio flammeus*). Species listed by the US Fish and Wildlife Service as Birds of Conservation Concern that occur in the area are golden eagle, ferruginous hawk, loggerhead shrike, sage thrasher, Brewer's sparrow, and sage sparrow (USFWS 2008).

The Bendire Complex fire eliminated nearly all migratory bird habitat within the perimeter, with the exception of a few small islands of vegetation that did not burn. Migratory birds in the area may utilize these small islands, edges of the burn perimeter, and areas adjacent to water sources in search of forage, but most birds were displaced by the nearly complete loss of vegetation in the burned area.

The Bendire Complex fire is the dominant factor influencing the affected environment for wildlife, special status wildlife, and migratory species, hereafter referred to as "wildlife", but other actions have helped shape the existing conditions. Other past and present actions affecting the area include road and fence construction, water developments, fiber optic line construction, fuels treatments, facility construction, livestock grazing, and recreation. These actions and events can have mixed effects on wildlife and their habitats depending on the species. Livestock grazing is the most widespread and long-term action occurring within the affected environment and is managed and monitored to facilitate sustainable multiple use, including maintenance of grasses and forbs to provide for wildlife on the landscape. Developed water sources are generally beneficial to numerous species, and may have improved distribution or increased populations of some species in the area. Roads and fences are a potential threat to wildlife species in the area due to collisions or loss or degradation of habitat. These structures may also provide advantageous singing or hunting perches or nesting structures that improve habitat for some species, such as ravens and golden eagles. Density of roads and fences is relatively low across the project area compared to other areas. Effects of past wildfires, vegetation treatments, and weed control treatments are not as readily

apparent since the Bendire Complex fire, but these have also influenced the resiliency of the habitat and its ability to recover from the wildfire.

Environmental Consequences

Effects Common to both Alternatives
For the purposes of this analysis, the CEAA for wildlife extends up to 10 miles beyond the fire boundary to encompass regular movements of most animals that may be using the project area. Most wildlife species have much smaller regular movements than ten miles; therefore, most effects to wildlife or their habitat would occur within or immediately adjacent to the burned area, and would diminish over time and as the distance from the project area increases. Vegetation in the CEAA is dominated by sagebrush steppe. The CEAA does not incorporate the entire annual use area for some animals, such as pronghorn and mule deer, because this information is not available nor is it expected to change the analysis. Beneficial effects of habitat recovery would increase over time, but would be expected to require several decades or more to fully recover to conditions present prior to the fire.

Past and present actions and events, such as those described in the Affected Environment, have also influenced the existing environment within the CEAA. Reasonably foreseeable future actions (RFFAs) or events within the CEAA include, livestock grazing, weed management, road maintenance, wildfires, aerial seeding, a fiber optic line, fuels treatments, and recreation. Several of these are similar to actions and events in the project area, and general effects for most of these are described in the Affected Environment section. RFFAs that may contribute to cumulative effects with this project are carried through analysis in the Environmental Consequences for each alternative, and include vegetation management associated with ongoing District weed treatments.

The risk of adverse effects to wildlife from dermal contact or ingestion would vary by the amount of herbicide applied to vegetation that is used as forage, the toxicity of the herbicide, physical features of the terrain, weather conditions, and the time of year. The likelihood of most larger and mobile wildlife species being directly sprayed is very low since human activity associated with herbicide treatments generally would cause wild animals to flee.

Disturbance from treatments would occur under both alternatives. With the implementation of Standard Operating Procedures and Mitigation Measures associated with weed treatments, this would be minimized and would not occur during critical periods. Smaller resident species, including small mammals, reptiles and invertebrates, would be affected by disturbance the most. Under both alternatives, treatments of invasive plants would affect less than one percent of sage-grouse, elk, and deer winter range across the district. Therefore, effects to these species would be negligible.

Many species of wildlife tend to avoid large areas infested with invasive plants. This is primarily due to the vegetation structural changes caused by invasive plants competing with natural vegetation as well as low palatability due to noxious weed defenses such as toxins, spines, and / or distasteful compounds (DiTomaso et al. 2006).

Some wildlife species such as elk and occasionally pronghorns consume large quantities of grass and are therefore potentially at risk where broad-scale applications of selective herbicides have been made on invasive plants where native grasses exist. Thus, 100 percent grass grazing scenarios were specifically modeled in the Ecological Risk Assessments. However, reaching Ecological Risk Assessment-identified risk levels would be unlikely unless the animals foraged exclusively within the treatment area for an entire day (USDI, 2010:269).

Alternative A: No Action

The use of 2,4-D and glyphosate present low to moderate risks to mammals under scenarios of direct spray and consumption of contaminated grass at the typical and maximum application rates. Inadvertent spraying of grass and other forage near treated invasive plants, as well as drift and other avenues, could result in exposure. In addition, treating medusahead with glyphosate when it is young and palatable could result in exposure.

Similarly, dicamba and picloram present low to moderate risks under some exposure scenarios. The primary targets for these two herbicides are broadleaf and woody species, so it can be used to target species infesting desirable grass areas without affecting the grass. Grazing of these sprayed grasses by wildlife could result in exposure (USDI, 2010:270).

Standard Operating Procedures and Mitigation Measures help prevent the moderate risks described above. These include minimizing treatments during nesting seasons, timing of treatments when wildlife species are absent or less vulnerable, and minimizing treatments around Special Status species (USDI, 2010:93). For the reasons described above, the likelihood of an exposure leading to illness or death of wildlife other than the least mobile species is low to none.

Without the use of more effective herbicides, invasive plants would persist and continue to spread and degrade habitat quality across the project area. This would not be favorable to sage-grouse populations and thus would not aid in preventing the listing of this species. This would also reduce the quantity of good quality habitat for small resident species as well as ungulates, thus limiting population growth of these publicly important species.

None of the currently authorized herbicides is selective for annual grasses, such as medusahead and cheat grass, which are two of the biggest threats to the persistence of sagebrush steppe and its associated wildlife community (Hagen 2011). Establishment and spread of these invasives may contribute to a shortened fire return interval, which would slow or even prevent the full recovery of sagebrush steppe, a critical habitat component for several Birds of Conservation Concern, sage-grouse, and other wildlife. Selection of this alternative would not actively improve the rate or increase the success of habitat recovery for many wildlife species. Objectives of the BLM's Sage-Grouse ARMPA to mitigate the adverse effects of fire on sage-grouse habitat would also not be met under this Alternative.

Alternative B: Proposed Action

This alternative would allow for the use of more selective herbicides that are effective at controlling noxious weeds and invasive annual grasses, while limiting collateral damage to

native and desirable non-native plants. Non-target desirable plants may be harmed, but risk would generally be limited to vulnerable (depending on selected herbicide) plants in the immediate treatment area, and have no effect on overall abundance or diversity of wildlife habitat. Application of the proposed herbicides using Standard Operating Procedures (SOPs) would not only improve the success of other ESR treatments, e.g. shrub planting and aerial seeding, it would help protect native plants that survived the fire. These native plants provide a valuable seed source adapted to the local environment, which further enhances the ability of the native plant community to recover (Leger, 2008) and provide a more diverse habitat for wildlife species. Implementation of this alternative would result in maintenance or improvement and a more rapid recovery of more acres of wildlife habitat compared to the No Action Alternative.

Wildlife may be impacted through direct or indirect contact or ingestion of chemicals or exposed plant, water, or animals, including insects. The proposed herbicides have a wider treatment window, allowing more flexibility in timing of treatments in order to avoid vulnerable periods for wildlife, such as during the nesting period for birds. Based on the findings of the Ecological Risk Assessments and following Standard Operating Procedures the potential risk to wildlife from ingestion or direct contact would be negligible, especially at the population level. Sagebrush obligate birds or birds strongly associated with sagebrush or shrub lands, such as sage-grouse, sage thrasher and sage sparrow, are even less likely to be affected due lack of adequate habitat to support populations following the fire. This would be the same for those bird species associated with juniper woodlands.

Discussion and links to Ecological Risk Assessments for the proposed herbicides are available in the Vegetation Treatments Using Herbicides on BLM Lands in Oregon FEIS (USDI, 2010 Appendix 8:605-608, Appendix 9:632, 633, 642) and the PEIS (USDI, 2007 for chlorsulfuron and Imazapic only, Appendix C). Imazapic and Chlorsulfuron had risk levels below the Level of Concern (LOC) for all evaluated wildlife under all scenarios (Oregon FEIS pp. 4-247 to 4-250). The risk assessment for clopyralid indicates there is little to no risk to terrestrial animals (SERA 2005, National Veg. EIS p 4-106). These Assessments and Impacts are herein incorporated by reference.

Cumulative Impacts

Cumulative effects of the Proposed Action in regards to wildlife as a whole are expected to be beneficial in the long term (10+ years). This is expected to allow for the recovery of the health and vigor of vegetation in burned and seeded] areas, providing greater hiding and nesting cover and increased forage relative to the No Action alternative. Even with implementation of the Bendire Complex Fire proposed actions, recovery of sagebrush habitat would be expected to require many years. Selection of this alternative would actively improve the rate or increase the success of habitat recovery, and would contribute cumulatively to the beneficial long-term effects of the fire to wildlife and their habitat.

Noxious Weeds

Affected Environment

The pervasive infestations of invasive annual grasses present in the lower elevations of the fire and adjacent lands present one of the most complex issues in this area. Verified pre-fire acres within the fire perimeter infested with medusahead are 2,000 with another 13,000 acres suspected, while cheatgrass is ubiquitous across the project area, making it difficult to map. These species of invasive annual grasses: displace desirable native and seeded vegetative species; compromises the ecological integrity of the watersheds; degrades habitat for sage-grouse and other important wildlife species; and creates continuous fine-fuels which lead to decreased fire-return intervals. Additionally, the fire made site resources (soil nutrients and moisture) readily available which the weeds, particularly the annual grasses, will capitalize on much more readily than the desirable vegetation. Because the entire fire area is currently occupied Greater Sage-Grouse habitat and management of invasive annual grasses is difficult under the best circumstances, it is imperative that herbicide treatments begin as soon as possible to take advantage of the reduced seed crop from the fire activity to rehabilitate this critical sage grouse habitat.

Within the Bendire Complex Fire, approximately 35 net acres (less than 2/10 of 1% of the project area) of thirteen known noxious weed species (Table 3.6) have been identified; these have been documented in BLM database or are verified by field experience, not including medusahead or cheatgrass. District databases and current monitoring data show that there are both noxious and invasive species within the fire perimeter. During ESR planning, several sites of *Ventenata dubia*, also referred to as North Africa wire grass or ventenata, were identified by staff specialist. Ventenata was listed as noxious by the Malheur County Court in 2015. Washington State University, Education Bulletin states: "Ventenata infestations seriously degrade the quality of hay, pastures, and Conservation Reserve Program (CRP, lands set-aside/fallow for one or more growing season) fields, as well as native range and transitional forest habitats. It has no known forage value for livestock or wildlife, causes soil to be prone to erosion due to its shallow rooting depth, limits the function of waterways, and reduces land values (WSU, 2008)."

In central Oregon, downy brome (cheatgrass), medusahead and ventenata can be found coexisting in rangelands and in some areas ventenata is displacing the two other species. (Sbatella and Twelker, 2013).

Of critical concern is the discovery of approximately 12 acres of yellow starthistle (*Centaurea solstitialis*) identified 1.5 miles outside the fire boundary on Bureau of Reclamation land on the north end of Beulah Reservoir by a firefighter during suppression activities. Further inquiry by Malheur County weed inspector found that a private landowner had identified one satellite site within the fire boundary on his private land on Warm Springs Creek. Yellow starthistle and spotted knapweed, as well as other noxious weeds and invasive annual grasses are known to degrade big game habitat. Spotted knapweed and yellow starthistle are particularly troublesome species that adapt well to areas similar to the Bendire Fire area. Both are known to exist in and adjacent to the project area. In Montana, Hakim (1979) found that estimated elk use was reduced as much as 98% on knapweed dominated range compared to

bunchgrass-dominated sites. Along the Snake and Salmon Rivers in Idaho, Idaho Department of Fish and Game (Idaho Department of Fish and Game, Window on the Clearwater, 2006) found that "Weeds can degrade plant composition and vegetation communities, replacing important forage and cover species on which wildlife rely. Forage on hundreds of thousands of acres of big game winter range has been replaced with knapweed or starthistle." IDF&G notes: "This reduces the availability of forage for deer and elk and reduces the number of big game animals these ranges can support. Many wildlife species also tend to avoid weed infestations, using instead areas where they may be more vulnerable to predators and hunters."

See Table 3.6 for species and known net acres (excluding large areas of medusahead rye infested rangeland).

Table 3.6: Noxious Weeds in Bendire Fire Complex

Noxious/Invasive Weed Species	Estimated Net Acres Present
Russian Knapweed	5.0
White top	5.0
Diffuse Knapweed	0.25
Canada Thistle	0.5
Bull Thistle	0.5
Ventenata	5.0
Yellow starthistle	0.25
Perennial Pepperweed	0.25
Dalmation Toadflax	0.25
Medusahead	10.0
Scotch Thistle	8.0
Mediterranean sage	0.25
Spotted Knapweed	0.5
Total	**35.75**

In addition to these known weed sites, there are approximately 2,000 acres of verified medusahead; however this is estimated to be low. Additional acres infested with light to moderate levels of medusahead are estimated to be as much as 13,000. The expectation is that these infestations would expand into previously uninfested areas, moving this area closer to the annual grassland. Areas where cheatgrass dominates the landscape have not yet been determined and won't be known until post-fire regrowth of cheatgrass (estimated to be in excess of 15,000 acres) begins during the winter and spring of 2016. The high fire intensity resulted in severe fire effects. Plant mortality appears to be high in the burned area with invasive annual grasses as a plant community component. The burn was fueled to some level by exotic annual grasses and by perennial native grasses and sagebrush. In many areas within the fire, soils were reduced to bare mineral leaving a receptive seed bed for the expansion of invasive species from adjacent infested areas. In the absence of competition, the burn area is extremely vulnerable to expansion or invasion by one or a combination of highly competitive

noxious and/or invasive annuals, biennials and perennial weed species. Weed control within the burn area would help prevent invasive/noxious species from dominating the site.

The Cumulative Effects Analysis Area (CEAA) for noxious weeds is the burn area plus a four-mile buffer surrounding the fire perimeter and suppression activities in conjunction with the Bendire Complex Fire. The ongoing and RFFA impacts to noxious weeds and potential for further invasion on the BLM-managed land are livestock grazing, hunting and other recreational activities. All of these could act as vectors for transporting noxious weeds from existing weed sites into the burned area. In addition to the burned area, firebreaks surrounding components of nearby infrastructure are at risk for weed invasion due to surface disturbance and would be monitored and treated as necessary. Impacts by livestock would be temporarily mitigated by removal until objectives are met. Impacts by invasive species, in particular mat forming annual grasses, would decrease recovery and establishment of desirable native and desirable non-native plant species. Emergency stabilization measures would increase establishment rates of native and desirable non-native plant species which would occupy sites that would otherwise become occupied by invasive annual grasses and noxious weeds.

The success of invasive and noxious species is based on their ability to outcompete native species with fewer or diminished resources. In many areas within the fire, the surface burned to mineral soil leaving a receptive seed bed for the expansion of invasive species. The combination of bare ground, ample nutrients, and sources of seeds means that the likelihood of invasive annual grass and noxious weed invasion into the burn is high particularly where there are healthy noxious weed seed sources near the fire perimeter or where there were existing infestations within the fire perimeter. Research and management have found ecological sites such as this to be vulnerable to invasive species. Since Medusahead and ventenata was previously present in the fire area in varying amounts, it is expected that the seed bank would take advantage of the favorable conditions.

Within the perimeter of the Bendire Complex Fire, noxious and invasive species have a high potential of spread throughout the burned area. Currently these infestations, excluding cheatgrass, ventenata and Medusahead, are managed using the best available methods, including the use of herbicides. Larger areas would be identified for broadcast treatments. Herbicides and adjuvants would be used in compliance with label instructions. During the second and third year following the fire, the entire burn area would be inventoried, with focus along roads, facilities, seeding, and planting locations. This inventory would focus on identifying areas of noxious weeds as well as areas where it appears that annual grasses are becoming dominant.

Outside the burn, but within four miles of the burn perimeter, there are an estimated additional 600 to 700 acres of noxious weeds including on private, state and Bureau of Reclamation lands, plus approximately 20,000 acres infested with Medusahead rye across all ownerships. Species located outside the burn perimeter have the potential to spread into the burned area via vehicle traffic, transport by wind and water, and by livestock and wildlife.

Road corridors are natural conduits for noxious weeds from infested areas long distances outside of the perimeter of the Bendire Complex Fire. Multiple treatments of the identified noxious weeds have been made in the past along the main traveled roads.

Table 3.7: Vale District Weed Treatments (Within 4 miles of the Bendire Project Area)

Year	Species	Acres Treated	Project Acres
2014	Whitetop, Scotch thistle, Spotted knapweed, Perennial Pepperweed	3.5	4,500
2012	Diffuse knapweed, spotted knapweed, Scotch thistle	1.5	1,500
2010	Scotch thistle, Russian knapweed,	0.5	1,500
2009	Scotch thistle, Spotted knapweed, Diffuse knapweed	4.0	2,500
2008	Scotch thistle, Russian knapweed, Spotted knapweed	3.5	3,000
2007	Scotch thistle, Russian knapweed, Diffuse knapweed, Perennial Pepperweed	5.0	1,500

Invasive, non-noxious species that occur in the area include cheatgrass (*Bromus tectorum*), various annual mustards, including tumble mustard (*Sisymbrium altissimum*) and clasping pepperweed (*Lepidium perfoliatum*), and Russian thistle (*Salsola kali*)

Environmental Consequences: Noxious Weeds

Alternative A: No Action

Under Alternative A (No Action Alternative), inventory and treatment would occur; however, only herbicides currently approved within the existing BLM noxious weed management plans would be used. These herbicides are not effective on Medusahead or ventenata - the primary noxious weed problem in the area - without causing unacceptable off-target damage. They are also only minimally effective on many of the other species such as perennial pepperweed and white top found throughout the burned area. Previously small sites of pepperweed and whitetop have been increasing in size yearly in the absence of an effective herbicide, and are expected to continue to increase and spread off-site under this Alternative. In addition, the objectives of the BLM's ESR program to mitigate the adverse effects of fire on the local resources in a cost effective and expeditious manner would not be met under this alternative.

Within the perimeter of the Bendire Complex Fire project area, approximately 35 net acres of thirteen different noxious weed species previously existed, in addition to approximately 2,000 acres of verified medusahead in the Bendire Complex burned area. Additional acres infested with light to moderate levels of medusahead are estimated to be as much as 13,000. Burning of the existing vegetation opened up the site for weed invasion by burning to mineral soil, leaving a receptive seed bed for the expansion of invasive species, especially by species that

were already present in or near the site. Without adequate intervention, it is expected that the areas surrounding these existing invasions would greatly increase in size unless treated prior to them becoming dominant on the site. Increases of this nature are exacerbated by the inability to use effective herbicides under the No Action Alternative. These increases reinforce the presumption that: "In spite of the efforts of the existing noxious weed program, noxious weeds are continuing to spread at an estimated rate of 12 percent per year." (USDI 2010:133).[5]

The likelihood of invasive annual grasses increasing within the burned area is very high under the No Action alternative. Once established, noxious and invasive vegetation is difficult and expensive to control or eliminate. An early seral plant community, such as a post-fire plant community, is much more susceptible to weed introduction and spread. The burned areas could also become a source of weed contamination for adjacent areas. The same weed vectors that transport noxious weeds into the burned area could distribute noxious weeds from the burn to other areas.

Alternative B: Proposed Action

The control of invasive annual grasses and noxious weeds under this Alternative would break up fuel continuity, increase fire return intervals, and increase the reproduction and vigor of existing native perennial plants, contributing to the long-term ecological stability of the plant communities in this area.

The Vegetation Treatments Using Herbicides on BLM Lands in Oregon ROD October 2010 (USDI, 2010), Vegetation Treatments on BLM Lands in 17 Western States ROD September 2007 (USDI, 2007), and the March 1, 2011 Order Amending Injunction [Case No. 83-cv-6272-AA (US District Court)] provide new information that enable BLM Districts in Oregon to utilize 13 new active ingredients for the treatment of noxious weeds, in addition to the 4 active ingredients currently available (2,4-D, dicamba, glyphosate, and picloram) under the Vale District Five Year Integrated Weed Control Plan (OR-030-89-19).

Under the proposed action, herbicide treatments within the project area could include the currently available four herbicides plus the following products (trade name, with active ingredient in parentheses): Plateau (imazapic), Telar XP (chlorsulfuron), and Transline (clopyralid). All seven herbicides considered in the Alternatives are described in tables 2.2 and 2.3. The product to be used on individual infestations would be determined based on weed species, phenology, site type, topography, aspect, status of desirable vegetation present and environmental conditions.

With the use of these three additional herbicide formulations, results would be substantially improved over the No Action. Plateau is effective on Medusahead and ventenata, the primary noxious weed problems in the area, as well as the ubiquitous infestations of cheatgrass, without causing unacceptable off-target damage. Telar is very effective on many of the other species such as perennial pepperweed and white top found throughout the burned area and

[5] See also the rate of spread discussion in the *Invasive Plants* section early in Chapter 3.

Transline is effective on and would provide better control for thistles, yellow starthistle and knapweeds. Previously small sites of pepperweed and whitetop which have been increasing in size yearly in the absence of an effective herbicide could be controlled or eradicated as new satellite sites were found. The risk of herbicide resistance is also greatly diminished with the use of new formulations allowing applicators to switch herbicides away from the historic practice of using the same less effective herbicides year after year.

Appendix B - Tables 1 – 4 summarize the effects to all resources for the additional herbicides proposed for use in the ESR plans.

On Vale District, as part of SOPs, areas burned by wildfire are monitored a minimum of two years post-fire. Any weeds found are treated using the most appropriate methods. Treatment areas are monitored annually to document efficacy and determine additional treatment needs. Where herbicide treatments are necessary, using these new products, either alone or in combination with other currently available products, would provide the best tools available to ensure effective, timely management of noxious weeds in this area. Controlling noxious weeds enhances the potential for success of rehabilitation of the project area following the disturbances from the 2015 wildfires.

Cumulative Effects

Past actions are reflected in the affected environment. Temporary fence construction and shrub planting associated with the Bendire Complex ESR, livestock grazing and moves, recreational use, plus the RFFAs would all have a cumulative impact to weed control efforts, but most are temporary and in the long term benefit weed control. Any surface disturbing RFFA or actions associated with ESR activities can be lessened or alleviated altogether by applying appropriate PDFs.

The CEAA for this analysis is the area within a four-mile distance of the perimeter of the Bendire Complex Fire boundary. It is possible that wind-borne weed seeds could travel farther than that to land in areas burned during the wildfire. Recreational activities such as hunting occur throughout this area as well. The use of Off-Road Vehicles is widespread and has the potential to be a vector of invasive and noxious weeds in the burned area.

Following wildfire, management of livestock movement, and temporary potential closures to grazing until objectives are met would help prevent the spread of noxious and invasive weed species by allowing native and desirable non-native species time to establish and develop. Healthy, desirable vegetation is more competitive against weedy species than vegetation that is stressed due to utilization before it can properly establish.

The combination of bare ground, ample nutrients, and sources of seeds means that the likelihood of noxious weed invasion into the burn is high; particularly where there are healthy noxious weed seed sources within the vicinity and directly adjacent to the burned areas or where the fire burned less intense and natives are stressed. Elevations below 5000’ tend to be more susceptible to invasion from invasive annual grasses and weeds.

Noxious weeds are commonly the first plants to reestablish following a wildfire and take advantage of the vulnerability of the fire weakened and stressed desired species. In the Great Basin it has been found, by research and management, that once annual grasses ecologically dominate a plant community and establish shorter fire return intervals, the plant community is unlikely to return to a native plant community. Additionally, annual grass communities are known to transition to other noxious weed dominated communities. The objective of the noxious weed treatment and survey is to continue treating previously known infestation sites and identify and treat new sites to halt the spread of noxious weeds in the burned area. The identified weeds are present in the burned area and if not treated, are expected to increase due to the removal of existing vegetation by the Bendire Complex Fire. Past treatments in the area have been relatively successful and by continuing to inventory and treat infestation and introductory sites the frequency of noxious weeds is expected to be reduced.

The most likely sources of new noxious weeds are vehicles, people, animals, wind and water. An aggressive early detection-rapid response action is a priority for the BLM to ensure that other noxious weeds and annual grasses do not establish within the burn perimeter. Treating newly discovered noxious weed infestations would help the burned area recover with desirable vegetative species. Treatment of new, small, noxious weed infestations is more likely to be successful than treating large established infestations. Treating noxious weeds on the public lands is expensive. It only becomes more expensive as infestations are allowed to become established and expand. The BLM would use the most applicable approved herbicides to treat weed infestations. Herbicides and adjuvant would be used in compliance with label instructions.

Roads are particularly susceptible to new introductions of weeds and spread of existing infestations through normal vehicle traffic as well as traffic associated with suppression efforts on the fire. Treatments that keep the roads free of weeds should be a high priority. New introductions can spread quickly in disturbed areas infesting previously weed-free areas. Livestock and wildlife are known to spread weed seed as they move across the area. Areas where livestock and wildlife congregate, such as reservoirs and mineral sites, are in a state of constant disturbance and thus more susceptible to new weed introductions.

Areas of Critical Environmental Concern/Research Natural Areas

Affected Environment

The North Ridge Bully Creek Area of Critical Environmental Concern/Research Natural Area (RNA) and South Ridge Bully Creek RNA are located within the project area (see Map 2). The 1,569 acre North Ridge Bully Creek RNA (North Ridge) has the following relevant and important values: big sagebrush/Thurber's needlegrass community; big sagebrush-three tip sagebrush/Idaho fescue community; and sage-grouse and their associate habitat. South Ridge Bully Creek RNA (South Ridge) is 620 acres and has the following relevant and important values: big sagebrush/Thurber's needlegrass community; big sagebrush-wild crab apple/Idaho fescue community; and sage-grouse and loggerhead shrikes and their associated habitat. Both RNAs are 100% within PHMA and North Ridge has 5 occupied leks.

There are no documented noxious weed sites in the South Ridge RNA and two documented Russian knapweed weed site totaling less than 1 acre within the North Ridge RNA. Weed inventory that would occur in 2016 may document an additional acre of noxious weeds.

The 2012 Iron fire burned 98% of North Ridge and 58% of South Ridge. Noxious weed treatments within the RNAs were implemented using the four existing chemicals. No treatments were implemented for invasive annual grasses. Site visits to the RNAs in 2013-2015 have shown an increase in the density of cheatgrass in the RNAs. The 2015 Bendire Complex fires reburned the North Ridge and South Ridge RNA, this time consuming 100% of North Ridge and 84% of South Ridge. Given the increase in cheatgrass following the Iron fire, the Interdisciplinary Team recommended treating the entirety of both RNAs with imazapic to give the native vegetation an opportunity to recover without competing for resources. In October of 2015 both RNAs were sprayed with imazapic at a rate of 6 oz. per acres to suppress germination of cheatgrass. The treated area will be monitored for effectiveness and analyzed to see if retreatment is needed to maintain the vegetation communities that are relevant and important values.

The Supplemental Program Guidance for Land Resources Manual 1623 provides basic guidance and information for the management of RNAs. The policy states "RNAs will be managed to preserve and protect the key natural attributes (relevant and important values) for which the area was formally recognized". Additionally RMP management direction for RNAs states, "Noxious weeds will be aggressively controlled using integrated weed management methods such as biological control, site-specific spraying, and grubbing by hand, consistent with protection and enhancement of relevant and important values" (SEORMP, pg. 68).

Environmental Effects

Effects to loggerhead shrikes (migratory bird) and sage-grouse are analyzed in the wildlife section. A summary of the analysis will be given in this section.

Alternative A: No Action

If the no action alternative is implemented the four currently authorized herbicides could be used within the RNAs to treat noxious weeds. Treatment of noxious weeds would occur on small site (generally less than 0.5 acres) or individual plants (spot). These small treatments would have a positive impact on the vegetative relevant and important values in the RNAs by reducing the weed competition with the native vegetation. During treatment, some non-target plants may be sprayed and affected by the herbicide. Given there is less than one acre of known noxious weeds and an anticipated 1 acre to be found during inventory, less than 1% of the RNA would have impacts to non-target species. This would not have a negative impact to the relevant and important values.

The four currently authorized herbicides are not effective against perennial pepperweed and whitetop. Any populations of these species would not be treated and would continue to spread within the RNAs, displacing native vegetation. Under the No Action Alternative glyphosate is not authorized for use on cheatgrass. If monitoring showed an increase in the

abundance of cheatgrass in the RNAs, there would not be an opportunity to retreat the cheatgrass to benefit the vegetative relevant and important values of the RNAs.

For the sage-grouse and loggerhead shrikes values, selection of this alternative would not actively improve the rate - or increase the success - of habitat recovery. Objectives of the BLM's Sage-Grouse ARMPA to mitigate the adverse effects of fire on sage-grouse habitat would also not be met under this Alternative. Selection of the No Action Alternative could lead to a degradation of the vegetative, sage grouse, and loggerhead shrike relevant and important values of the RNAs.

Alternative B: Proposed Action

The proposed action would authorize the use of the additional herbicides and authorize use of herbicides on cheatgrass. The herbicides chlorsulfuron and clopyralid are effective in treating perennial pepperweed and whitetop. These herbicides would be used to treat small sites (generally less than 0.5 acres) or individual plants (spot). The herbicide imazapic, used as a preemergent at a rate of 6 oz. per acre, is selective in treating annual species.

The effects of noxious weed treatments in the RNAs would be similar to the No Action Alternative. With the additional herbicides, perennial pepperweed and whitetop could be treated if found and stop their spread to other areas in the RNAs.

If treatment monitoring shows cheatgrass increasing in density in the RNAs a retreatment with imazapic may be necessary. Imazapic would be aerially sprayed at a rate of 6 oz. per acre in the fall. At these low rates, used to control invasive annual grasses, imazapic poses a low risk to other terrestrial plants. Terrestrial plants are not at risk from off-site drift, surface runoff or wind erosion of imazapic. When used to control invasive annual grasses, imazapic did not affect perennial forb cover, however, it reduced the cover of native annual forbs and Sandberg's bluegrass for at least three years post-treatment (Pyke, et al. 2014). Susceptibility of native perennial plants as adults or seedlings is unknown for many species and soil types; thus, there is some uncertainty about the retention of native perennials when this herbicide is used as a selective herbicide for annual grasses, yet, multiple studies have shown imazapic used to reduce cheatgrass continuity have been successful and have not reduced some perennial grasses (Shinn and Thill 2004, Miller 2006, Davison and Smith 2007). Due to the uncertainty of the effects of imazapic on perennial grasses, retreatment would be limited to 10% of the RNAs and post treatment monitoring would be implemented to assess the effects of the treatment.

Although impacts to perennial bunchgrass communities are inconclusive, and there are short term, 1-3 years, impacts to annual forbs and Sandberg's bluegrass, the long term benefit of reducing the cheatgrass competition is beneficial in the long term, 3-20 years, and will help maintain or improve the vegetative relevant and important values.

Selection of this alternative would actively improve the rate or increase the success of habitat recovery, and would contribute cumulatively to the beneficial long-term effects of the fire to sage-grouse, loggerhead shrike, and their habitat.

Cumulative Effects

For the purposes of this analysis, the CEAA is the North Ridge and South Ridge RNA boundaries. Past actions are reflected in the affected environment. Temporary fence construction and shrub planting associated with the Bendire Complex ESR plan, livestock grazing, recreational use, and projects associated with the Oregon Greater Sage-Grouse RMP Amendment are RFFAs which may occur within the RNAs. These projects are designed to maintain or improve the relevant and important values of the RNAs. The proposed action for this project, plus the RFFAs, do not have a cumulative negative impact on the North Ridge and South Ridge RNAs.

Riparian Zones, Wetlands, Fisheries, Water Quality, and T&E Aquatic Species

Affected Environment

The Bendire Complex Fire burned portions of the Lower Malheur Hydrologic Unit (Code 8th Field [HUC8] 17050116) and Bully Creek (HUC8 Number 17050118) subbasins. For the purpose of this analysis, the Cumulative Effects Analysis Area (CEAA) for water quality, wetland/riparian areas, and special status species fish extends to the sub-watershed level boundaries (HUC12) around the Bendire Complex Fire (See Map 6). This includes portions of the following HUC12 sub-watersheds:

Lower Malheur Subbasin
- Warm Springs (HUC12 Number 1705501161302)
- Bendire (1705501161301)

Bully Creek Subbasin
- Headwaters Bully Creek (1705501180101)
- South Fork Indian Creek (1705501180102)
- North Fork Bully Creek-Bully Creek (1705501180106)\
- Middle Clover (1705501180203)
- Lower Clover (1705501180204)

Within the CEAA there are 192.2 miles of intermittent or seasonal and 14.9 miles of perennial stream miles in Vale District. These mileages include both BLM-managed and private stream miles.

Riparian Resources

The majority of perennial stream reaches on BLM-administered land in the CEAA that have been degraded in the past have been evaluated to determine Proper Functioning Condition (PFC). PFC Standards for Rangeland Health (BLM 1998) provide protocols for assessment of the hydrologic system potential to provide for water quality, fish and wildlife habitat, aesthetics, and forage. PFC is a qualitative assessment that considers hydrology, vegetation, and soil/landform attributes and rates riparian function as:

- PFC: *Riparian-wetland areas are properly functioning when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality, filter*

sediment, capture bedload, and aid in flood plain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity.

- Functional At-Risk (FAR): *Riparian-wetland areas that are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation*. Stream reaches determined to be FAR are further assessed for Trend – upward (FARU), not apparent (FARN), or downward (FARD).
- Nonfunctioning: *Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, etc*.

PFC does not necessarily equate to potential natural community, advanced ecological status or desired future condition. Rather, PFC demonstrates the level of resilience required for system function that allows for maintenance and recovery of various values such as water quality and fish habitat. Less than 23 miles of the streams in the analysis area have been assessed. For those streams assessed in the CEAA the following ratings apply, 43% are Functioning at Risk Not apparent, 5% are Functional at Risk Upward Trend, 37% are Nonfunctional, and 15 % are Proper Functioning Condition. The stream reaches assessed as FAR and Nonfunctional were characterized as limited by the type or amount of riparian vegetation.

Fisheries

Four streams within the Bendire ESR Project Area (Bendire Creek, Bully Creek, Clover Creek and Warm Springs Creek) are considered habitat for Great Basin redband trout (*Oncorhynchus mykiss ssp*.), a BLM tracking species and state sensitive-critical species for the State of Oregon. Redband trout prefer cold, clear, fast-flowing water with clean cobbles and gravels. These trout are adapted to the dry, hot summers of eastern Oregon and can withstand short periods of time at peak water temperatures of 24.0 to 27.0 °C (75.0 to 80.0 °F), which would be lethal to most other trout (Bowers, et al., 1979). Fish habitat data, beyond riparian assessments and water quality data has not been collected on the streams within the CEAA.

Water Quality

Water quality is monitored to assess whether the quality of the water resources in the District are adequate for fish, recreation, drinking, agriculture, as well as other uses. The Oregon Department of Environmental Quality (ODEQ) has established the water quality standards for the State of Oregon that are designed to protect the most sensitive of these multiple uses. In this case redband trout is designated as the most sensitive use and to which the standards are based upon. The summer stream temperature standard for streams within the CEAA is 68˚ F.

Within analysis area sub-watersheds within the CEAA there are four streams identified by the ODEQ as water quality impaired under section 303d of the Clean Water Act. These streams are Bendire, Bully, South Fork of Indian Creek and Clover Creek (ODEQ 2010). Of these only one Bully Creek is listed for impairment by herbicides. Other concerns for the listed streams were E. Coli, fecal coliform, flow modification, habitat modification and temperature.

The BLM is the minority land owner along the approximate 40 mile length of Bully Creek listed, with 85% of the land adjacent to the creek in private ownership.

Wetlands

Within the analysis area there are approximately 151 acres of BLM and private land classified as wetlands under three National Wetlands Inventory categories: 89 acres of fresh water emergent, 51 acres fresh water forested /shrub, 10 acres of freshwater pond, and approximately 10 acres of unclassified wetlands

Table 3.8: Acres of Wetlands by Ownership within the Bendire Project Area

Wetland Category	BLM-Administered Lands (Ac)	Private Lands (Ac)	Total Acres	BLM (%)	PV (%)
Freshwater Emergent Wetland	51.57	37.60	89.17	57.83	42.17
Freshwater Forested/Shrub Wetland	5.80	46.18	51.98	11.16	88.84
Freshwater Pond	9.15	1.55	10.70	85.47	14.53
Totals by Ownership	66.51	85.34	151.85		

Source: National Wetlands Inventory base data.

Environmental Consequences

Actions Common to Both Alternatives

Under both alternatives riparian area, aquatic, water quality, fisheries and water resources in general are protected through adherence to appropriate buffers and other required design features as outlined in Appendix A.

Fisheries and water quality within and downstream of the Bendire Complex Fire perimeter may be impacted through direct or indirect contact or ingestion of chemicals or exposed plant, water, or animals, including insects. However, the potential for adverse effects on riparian, fish and other aquatic resources is minimized for both alternatives by existing Standard Operating Procedures associated with, and specific to, the specific herbicide proposed. Based on the findings of the Ecological Risk Assessments, following Standard Operating Procedures, the potential risk to fishes from ingestion or direct contact or depreciation of water quality would be negligible, especially at the population or watershed level. Effects by herbicide on resources are identified in Table 2 Appendix B from the Oregon FEIS (USDI, 2010) and are herein incorporated by reference.

Soils exposed after a fire are prone to erosion, including riparian soils. The combination of vegetative loss in riparian areas along with upland vegetation loss could include compromising bank stability, down cutting, and channel migration in the lower less confined reaches. Displaced soils would be deposited within channels, silting over gravelly

areas that are important resting and spawning spots for salmonid species. Increased stream temperatures caused by sediment absorption of light can reduce dissolved oxygen in water.

Wildfires also promote the spread of invasive annual grasses and noxious weeds. Invasive annual grasses cause soil to be prone to erosion due to their shallow rooting depth. In the Bendire Complex, Medusahead and cheatgrass in particular promote shorter fire return intervals because it is highly flammable and increases fuel loads across the landscape.

For both alternatives, impacts from invasive plant treatments on adjacent non-federal land ownerships may occur.

Table 3.9 provides herbicide information on aquatics and water resources.

Table 3.9: - Herbicides Used for both Aquatic and Terrestrial Vegetation Control

Herbicides available under both alternatives	
2,4-D	Some salt forms of 2,4-D are registered for use in aquatic systems. Aquatic forms of 2,4-D have been used for decades across the District to suppress species such as Canada thistle in riparian areas. Currently no submerged plants are being managed on the District with 2,4-D, therefore, no forms of 2,4-D are being applied directly to water. 2,4-D is a known groundwater contaminant although potential for leaching into groundwater is moderated by its being bound to organic matter and its short half-life. In terrestrial applications, most formulations of 2,4-D do not bind tightly with soils, and therefore have a moderate potential to leach into the soil column and to move off site in surface or subsurface water flows (Johnson et al. 1995 cited in Tu et al. 2001). In a study on groundwater in small shallow aquifers in Canadian prairies, 2,4-D was detected in 7 percent of 27 samples (Wood and Anthony 1997).
Glyphosate	Glyphosate is registered for aquatic use and would be applied to wetland vegetation. Strong adsorption to soil particles and organic matter slows microbial degradation, allowing glyphosate to persist in aquatic environments in bottom sediments (half-life of 12 days to 10 weeks) (Goldsborough and Brown 1993, Extension Toxicology Network 1996a, all cited in Tu et al. 2001). While glyphosate is very water soluble, it is unlikely to enter waters through surface runoff or subsurface flow because it binds strongly to soil particles, except when the soil itself is washed away by runoff. Even then, it remains bound to soil particles and generally unavailable (Rueppel et al. 1977, Malik et al. 1989, all cited in Tu et al. 2001). Studies that are more recent found solution-phase glyphosate in 36 percent of 154 stream samples, while its degradation product, aminomethylphosphonic acid, was detected in 69 percent of the samples. Glyphosate may stimulate algal growth at low concentration; Austin et al. (1991) have suggested that this could contribute to eutrophication of waterways. However, the study has more implications in streams flowing through agricultural and urban areas where glyphosate is shown to be relatively common, although additional phosphates from those same areas might mask the effect. The amount of glyphosate expected to reach streams from BLM terrestrial applications would be expected to have no noticeable contribution to eutrophication.
Herbicides Used for Terrestrial Vegetation Control	
Herbicides available under both alternatives	
Dicamba	Because dicamba is mobile in soil, terrestrial application of this herbicide can result in groundwater and surface water contamination. Biodegradation is the major mechanism for dicamba degradation in water. Dicamba is a known groundwater contaminant, and has a high potential to leach into groundwater. The EPA has set health advisory concentration levels for dicamba (e.g., 300 µg / L for 1-day exposures), but has not set maximum concentration limits for potable water. A regional study of pesticides in shallow groundwater in Delaware, Maryland, and Virginia detected dicamba in groundwater at low concentrations, generally less than 3 µg / L (ppb) (Koterba et al. 1993).

Herbicides Used for Terrestrial Vegetation Control	
Herbicides available under both alternatives	
Picloram	Can move off site through surface or subsurface runoff. Picloram does not bind strongly with soil particles and is not degraded rapidly in the environment (Tu et al. 2001). Concentrations in runoff have been reported to be great enough to damage crops, and could cause damage to certain submerged aquatic plants (Forsyth et al. 1997 cited in Tu et al. 2001). Picloram may degrade through photolysis, especially in non-turbid and moving water. Woodburn et al. (1989, cited in Tu et al. 2001) found that the half-life of picloram in water was 2 to 3 days but the EPA reported it stable to hydrolysis and unlikely to degrade in ground water, even over several years (EPA 1995). Maximum picloram runoff generally occurs following the first significant rainfall, after which runoff concentrations drop to levels that persist up to two years post-application (Scifres et al. 1971, Johnsen 1980, Mayeux et al. 1984, Michael et al. 1989, all cited in Tu et al. 2001).
Herbicides available in limited areas under the No Action Alternative	
Chlorsulfuron	Persistent and mobile in some soils. In aquatic environments, the environmental fate of chlorsulfuron is related to pH and temperature. Hydrolysis rates are fastest in acidic waters and slower in more alkaline systems (Sarmah and Sabadie 2002). As hydrolysis rates drop, biodegradation becomes the mechanism affecting the breakdown of chlorsulfuron. Aquatic dissipation half-lives from 24 days to more than 365 days have been reported (ENSR 2005c), with a shorter time reported for flooded soil (47 to 86 days) than anaerobic aquatic systems (109 to 263 days; SERA 2004a). Chlorsulfuron is not known to be a groundwater contaminant, but has a high potential to leach into the groundwater.
Clopyralid	Does not appear to bind tightly to soil and will leach under favorable conditions. However, leaching and subsequent contamination of groundwater appear to be minimal (SERA 2004b), which is consistent with a short-term monitoring study of clopyralid in surface water after an aerial application (Rice et al. 1997a cited in SERA 2004b). Clopyralid is not known to be a common groundwater contaminant, and no major off-site movement has been documented. Clopyralid does not bind with suspended particles in water; biodegradation in aquatic sediments is the main pathway for dissipation. The average half-life of clopyralid in water has been measured at 9 and 22 days (Dow AgroSciences 1998).
Imazapic	In aquatic systems, imazapic rapidly photodegrades with a half-life of one to two days (Tu et al. 2001). Since aerobic biodegradation occurs in soils, aerobic biodegradation is likely important in aquatic systems. Aquatic dissipation half-lives have been reported from 30 days (water column) to 6.7 years in anaerobic sediments (SERA 2004c). Little is known about the occurrence, fate, or transport of imazapic in surface water or groundwater (Battaglin et al. 2000). However, according to the herbicide label for Plateau, in which imazapic is the active ingredient, it is believed to be a groundwater contaminant (BASF 2008).

Source: Oregon FEIS (2010) pp. 194-196

Alternative A: No Action

Under the no action alternative, invasive annual grasses would increase in dominance in and around the project area. Effects of increased annual grass populations to water quality, fisheries, and riparian zones would occur from multiple, repeated wildfire disturbances occurring over a broad timeframe. As fire frequencies increase across the landscape, potential impacts to water quality from increased erosion and turbidity would occur more frequently.

Under the No Action alternative objectives of the Bureau of Land Management's ESR program to mitigate the adverse effects of fire on the local resources in a cost effective and expeditious manner would not be met.

Alternative B: Proposed Action

The herbicide application design features – method of application, aerial spraying conditions and restrictions to avoid drift of herbicide, rates of application, etc. - in the Proposed Action would minimize impacts to riparian vegetation and water quality. Impacts may occur in ephemeral drainages, which often do not have buffers. Herbicides applied directly to these drainages may be translocated through in-stream flow if storm flow closely follows application or is large enough to create significant surface flow in the channels. Effects are noted in Table 3.9 above from the Oregon FEIS and are incorporate here by reference (The

2007 National Vegetation FEIS pp. 4-28, Table 4-9 quantifies the off-site movement potential of the chemicals incorporated in the Proposed Action. Even if a herbicide has runoff or leaching potential, the likelihood of it reaching a water body also depends on site characteristics. For example, if a persistent herbicide with a high potential for leaching to groundwater was used at a site with low annual precipitation, and the depth to groundwater was over 100 feet, the overall potential for that herbicide to reach groundwater before degrading would be quite low (USDI, 2007, pp. 4-26). General site characteristics of the proposed project area coupled with current buffer protections help to minimize accidental direct application or drift at concentrations high enough to impair water quality.

Fisheries and water quality within and downstream of the Bendire Complex project area may be impacted through direct or indirect contact or ingestion of chemicals or exposed plant, water, or animals, including insects. However, the three proposed additional herbicides (imazapic, chlorsulfuron and clopyralid) have a wider treatment window, allowing more flexibility in timing of treatments in order to avoid vulnerable periods for wildlife. Based on the findings of the Ecological Risk Assessments, following Standard Operating Procedures, design features and mitigation measures, the potential risk to fishes from ingestion or direct contact or depreciation of water quality would be negligible, especially at the population or watershed level. Effects by herbicide on resources are identified in the Oregon FEIS (2010) Table 2 - 4, Appendix B.

As long as standard operating procedures for stream buffering and chemical application are followed for Standard Operating Procedures for herbicide application there is no measurable risk to water resources and wetlands/riparian areas. (See Appendix A for SOPs, MMs and BMPS)

The proposed action aims to reduce upland erosion and sediment delivery caused or exacerbated by the wildfire through inhibiting the growth of annual species. To that end, the Proposed Action, in general, would minimize negative effects to water quality and riparian zones from the wildfire by taking action to reduce erosion. The sooner perennial vegetation is established and the denser it is, the smaller the chances of an erosion event. Direct application avoidance of the few perennial streams and all surface water, along with season of application, would limit the opportunity for herbicide mobility during the herbicide's active life, resulting in a negligible impact to movement of the herbicide overland and into stream systems.

The lasting effects from the Proposed Action and RFFAs include improved hydrologic function of the watershed as the site becomes re-vegetated with desirable species. Treatments for soil stabilization would protect water quality by minimizing erosion and post-fire sediment delivery to stream channels.

Upland treatments would have no direct effects on fisheries riparian water quality, or floodplains.

Cumulative Impacts
Past, present and RFFAs in the CEAA that may contribute to cumulative effects to water quality, wetland/riparian areas and redband trout include livestock grazing, fishing, wildfire, sediment load from road crossings, prescribed burning, riparian planting, riparian exclosures, past use of herbicides, and rehabilitation seedings. Livestock grazing and wildfire are activities that are expected to occur over the long term (more than 20 years). Benefits to riparian and aquatic environments would occur from the upland treatments designed to stabilize soil, minimize rill and gully erosion, and protect streambanks. Sediment loading from road crossings is planned to be addressed and corrected as funding allows. There are no current quantitative estimates through monitoring as to how much sediment is being delivered from these sources.

The use of herbicides on private lands is not under the control of the BLM and therefore would be difficult to predict the cumulative effects of the No Action and Proposed action. If SOPs, MMs and design features are followed it is expected that any contribution of herbicides by either the No Action or Proposed Action to listed streams would be negligible.

Social and Economic Values

Affected Environment
Livestock raising and associated feed production industries are major contributors to the economy of Malheur County. Livestock production accounts for 49% of total county agricultural commodity sales (Oregon State University [OSU] Extension Service, January 2011). Cattle and calf production in the county produced over $134 million in gross sales in 2012 (OSU, May 2013); an important percentage of which is generated through public land grazing. Malheur County led the state of Oregon in production of number of head of cattle/calves (200,000 or 16% of the total Oregon production, with over 62,000 beef cows which calved (ODA, 2013).

Currently affected allotments are licensed for approximately 31,712 AUMs among all allotments impacted by the fires. At the current rate of $2.11/AUM (Animal Unit Month fee charged by BLM), this represents approximately $67,000 on an annual basis). The allotments directly impacted total approximately 260,000 acres, of which approximately 54,000 acres are affected by the fire. With Vale BLM's intent to construct temporary fencing on pastures where less than 50% burned to allow continued grazing in the unburned portion, there would be approximately 7,000 AUMs reduced to allow the burned areas to recover. This would result in approximately $15,000 in lost grazing receipts directly to the Treasury.

The affected permittees would be required to find alternative forage for the unavailable AUMs. Of the approximately 31,712 AUMs directly impacted by the fire, approximately 7,000 AUMs on public lands will be rested until the treated areas have met objectives and range improvements have been repaired. Replacement forage for the estimated 7,000 AUMs (Fair Market Value for AUMs is between $17 and $25 [compared to BLM AUMs at $2.11/AUM]) which would cost approximately $119,000 using the lower AUM rate to replace the existing AUMs on an annual basis. Hay to replace the 7,000 AUMs would require

approximately 1,750 tons (1 ton of hay per cow per 4 months or 0.25 ton per AUM). Current cost of hay is averaging $125 to $250/ton. The cost to feed hay to replace the AUMs would be approximately $218,750 to $437,500 plus labor on an annual basis.

"Quality of life" perceptions are dependent on the individual when determining what is valued in a lifestyle and what features make up that lifestyle. Lifestyle features can be determined by historical activities of the area, career opportunities and the general cultural features of the geographical area. Quality of life issues are subjective and can change over time with exposure to other ways of living. Recreation is a component of many people's lifestyles. Recreational opportunities in the project area were impacted both within and adjacent to the Bendire Complex fires. These include driving for pleasure, camping, backpacking, fishing, boating, hunting, hiking, horseback riding, photography, wildlife viewing, and sightseeing. These activities contribute to the overall quality of life for residents and visitors. Primary recreation activities in the area are deer, elk and chukar hunting, hiking, boating, and camping. Other recreation activities are fishing, rock-hounding, photography, and wildlife viewing.

Beulah Reservoir, to the southwest of the Bendire Fire has camping and boat launch facilities and in locally popular. Castle Rock, within a designated Wilderness Study Area and a part of a BLM designated Area of Critical Environmental Concern has significant vistas and visual resources of interest to a broader public, and has well known historic and prehistory values. On the west side of Castle Rock, within 20 miles of the Bendire Complex project area is the BLM-managed developed campground, Chukar Park. The facility has multiple campsites for tent and trailer camping, and provides potable water and access to the North Fork of the Malheur River. Recreational visitation between 10/1/2014 and 9/30/2015 was 2910 visits.

Visitation to the vicinity of the Bendire Complex ESR Project Area is not available. The area is well known for high quality hunting opportunities and is well used in the fall by local hunters and visitors. Travelers access services in the larger communities of Vale in Malheur County and Burns in Harney County, along with smaller lodging and restaurant facilities in Juntura and Drewsey, Oregon.

In addition to local recreation use, the undeveloped, open spaces in the county are themselves a tourist attraction and contribute a "sense of place" for many, as well as providing remote, undeveloped outdoor experiences. The attachment people feel to a setting, often through a repeated experience, provides them with this sense of place. Attachments can be spiritual, cultural, aesthetic, economic, social or recreational.

Tourism also contributes revenue to local business through use of service sector opportunities, both at the local community level and the broader region, including the relatively close services available throughout the Treasure Valley, shared by several counties in Idaho and Malheur County in Oregon. Travel and tourism related employment contributes over 1,000 jobs within Malheur County (EPS, 2015). Travel and tourism sectors provide services to both visitors and local residents and enhance opportunities to enjoy local amenities, including open spaces found on public lands including those found in and near the Leslie Gulch recreation area. Visitors to the region often utilize services including restaurants, fuel sources, and

accommodation. Lodging related employment contributes over 12% of Malheur County's overall number of jobs (EPS, 2015).

Environmental Consequences

Effects Common to both Alternatives:
The CEAA for this project is western Malheur County. RFFAs such as grazing, recreational pursuits, noxious weed treatments and prescribed burning to reduce hazards fuels and restore habitat would continue under both alternatives. The Natural Resource Conservation Service, in partnership with private land owners and state-managed lands will continue their invasive species management and sagebrush restoration efforts. The BLM expects that road maintenance would continue to occur on primary State, private and BLM routes. The Beulah reservoir dam management and maintenance is conducted throughout the year, particularly during the irrigation season. Vale Oregon Irrigation District manages Beulah reservoir discharges. Implementation of either of the alternatives in combination with the above listed RFFAs is not expected to measurably contribute to cumulative effects.

The affected permittees would be required to find alternative forage for the effected AUMs. Of the approximately 31,712 AUMs directly impacted by the fire, approximately 7,000 AUMs on public lands rested until the treated areas have met objectives and range improvements have been repaired. Replacement forage for the estimated 7,000 AUMs (Fair Market Value for AUMs is between $17 and $25 [compared to BLM AUMs at $2.11/AUM]) which would cost approximately $119,000 using the lower AUM rate to replace the existing AUMs on an annual basis. Hay to replace the 7,000 AUMs would require approximately 1,750 tons (1 ton of hay per cow per 4 months or 0.25 ton per AUM). Current cost of hay is averaging $125 to $250/ton. The cost to feed hay to replace the AUMs would be approximately $218,750 to $437,500 plus labor on an annual basis.

Alternative A: No Action
Under the No Action Alternative, the project area affected by the Bendire Complex fires would have limited noxious weed treatments, utilizing the four currently authorized herbicides. As described in the Weeds section above, known and estimated noxious weeds which would be treated with these herbicides infest approximately 100 acres of the project area. Other invasive species would be left to reclaim naturally. In - and adjacent to - the project area, the BLM expects that invasive species and noxious weeds such as ventenata and Medusahead would establish and spread. Annual grasses such as cheatgrass are present throughout the project area and are fine fuels that are easily ignited and quickly spread; continuing the current trend of shortened fire return intervals and higher intensity fires. These traits can reduce the multiple-use values of the area.

Invasive annual grasses were present in many areas of the Bendire Complex fire. Without treatment, the existing seed bank may out-compete remaining native bunchgrasses and displace forb and sagebrush recovery, further reducing the forage value for livestock production, as well as the intrinsic value of native vegetation and the resources provided for flora and fauna habitat. Invasive annual grasses are among the earliest grass species to green

up during the spring. Consequently, soil moisture typically used by native perennial grasses is used by invasive annual grasses prior to native grasses coming out of dormancy. Medusahead and ventenata are poor forage species for both livestock and wildlife. If not treated, range conditions would decline as this species begins to dominate native plant communities. Because of the low forage quality of Medusahead and ventenata, carrying capacity for all demands, including wildlife, within the fire perimeter and beyond would decline as desirable species are replaced with aggressive noxious weeds. According to the FEIS for Vegetation Treatments using Herbicides on BLM Lands in Oregon, July 2010, livestock carrying capacity could be reduced by 35 to 90 percent from weed infestations lowering yield and quality of forage (page 321).

As a result of a shift in vegetative communities to more of an annual component, the potential exists for rangelands to move toward a downward trend. Poorer range conditions could lead to lower weaning weights or a reduction in overall cattle numbers, distressing the economics of the affected ranchers, as well as the chance of the BLM permanently reducing permitted AUMs on the allotments.

The Federal government would not collect grazing permit fees from the permittees until monitoring indicates livestock can resume grazing.

No supplies or proposed action-related services would be purchased from local vendors under this alternative; however, the BLM expects that local residents would be hired to augment the existing workforce in addition to opening other contracting opportunities.

The additional three herbicides considered under the Proposed Action - which were made available to apply on invasive annual grasses and noxious weed species on public lands (BLM, 2010) - would not be allowed under the No Action alternative, leaving the area vulnerable to future wildfire events, particularly with regard to invasive annual grasses like cheatgrass and Medusahead. Without the use of effective chemicals to reduce these invasive plants, BLM and surrounding lands would be affected in a variety of negative ways. Infestations can reduce recreational land values and the spiny species can cause human health problems (Oregon FEIS, page 321). In addition, invasive plants can have a negative effect on observation-based tourism, as the wildlife and wildflowers that people come to enjoy and photograph are crowded out by invasive plants (FEIS, page 321). Significant investment is being made on adjacent private and State lands, using the herbicide imazapic to control infestations of cheatgrass and Medusahead. Under the No Action alternative, seed of these species are expected to germinate and subsequently drift to adjacent land ownerships, impacting productivity on these other ownerships.

At the same time, public lands in and around the burned areas would continue to contribute social amenities such as open space and recreational opportunities (including hunting, hiking, sightseeing, and camping). As the burned areas reclaim naturally, the BLM expects that an early reduction in recreation use would increase to preburn levels. These amenities enhance local communities and tourism, though the specific contribution of these allotments is not known.

Alternative B: Proposed Action
BLM employees and contractors executing the ESR plan would be expected to boost the local and broader regional economy for the three years that the plan is expected to require for completion.

Further, non-resident contractors would use facilities in the CEAA for supplies and lodging. Small economic increases during implementation of the proposed action are likely to occur for the more distant towns of and Vale/Ontario, Oregon. Both areas provide a broader range of services and supplies, including airports, and are anticipated to benefit from the ESR activities.

This alternative would utilize contracts to apply spot treatments or aerial applications of herbicide. To contract all of the herbicide treatments under this alternative, the cost is estimated to be approximately $800,000 for the maximum acres proposed in this EA. Contracting projects would provide economic opportunities for local contractors and suppliers.

No effects to a visitor's experience or opportunities are expected by implementing the Proposed Action.

Management of invasive plants affects the goods, services and uses provided by BLM lands is provided in the Oregon FEIS (USDI, 2010:321). The BLM would be perceived as a more equal partner in weed control efforts with the means to use a wider range of herbicides. Wildland fire-related costs could be reduced because of the additional invasive grass treatments (USDI, 2010:325).

Continued maintenance of roads would allow for continued enjoyment of driving for pleasure, hunting and grazing administration. However, some may feel the presence of roads within any area affects their solitude and their social values.

Soils and Biological Soil Crusts

Affected Environment

General Soils
Due to loss of vegetation burned during the fire, soils are exposed and the risk of soil loss due to wind or water erosion for all soil associations has increased. Post-fire rain events have already produced rills and gullies on the steeper slopes.

The burn area consists of soils typical of the arid lands region. No detailed soil survey data are available through a Natural Resource Conservation Service (NRCS) Soil Survey; however soil data are available for the BLM through a forth order soil survey developed by the Oregon State Water Resources Board and the Soil Conservation Service in 1969. The following information comes from, Oregon's Long-Range Requirements for Water General Soil information (State Water Resources Board, Malheur Drainage Basin, and Owyhee Drainage Basin 1969). Map 7 provides general soil units in the burned area of the Vale District.

Within the fire perimeter, 95% (268,041 acres) of the soils consist of five classifications on all land ownerships within the Bendire burned area. Unit 76 comprises 68% (36,561acres), Unit 60-13% (7,256 acres), Unit 83-7% (4,028acres), Unit 84-5% (2,507acres), and Br 3% (1,563 acres). A narrative of these soils is provided below. Classifications of less than 1% will not be detailed (see descriptions below). BLM lands comprise approximately 85% of the land. Of the BLM lands burned, Unit 76 comprises 57% (30,756 acres), Unit 60-13% (7,046 acres), Unit 83-6% (3,286 acres), Unit 84-4% (2,331acres), and Br 3 % (1,342 acres).

UNIT 76 SOILS
68% of all lands within fire (36,561 acres)
57% of BLM lands (30,756 acres)

Unit 76 soils are shallow, clayey, very stony, well-drained soils over basalt, rhyolite, or welded tuff. They occur on gently undulating to rolling lava plateaus and some very steep faulted and dissected terrain. The native vegetation consists mostly of bluebunch wheatgrass, Sandberg bluegrass, big sagebrush and low sagebrush. Elevations range from 3,500 to 6,500 feet. Average annual precipitation is between 8 and 11 inches, and mean annual air temperature centers around 45º F. Unit 76 soils are associated with Unit 55, 75, S75, 75L, S76, 76L, and 77 soils and rock land. Unit 76 soils are used for range. Stones limit potential for range seeding and they are too stony for irrigation.

UNIT 60 SOILS
13% of all lands within the fire (7,256 acres)
13% of BLM lands (7,046 acres)

Unit 60 soils are moderately fine-textured, well drained soils on gently sloping to hilly uplands underlain by old lacustrine sediments of the Idaho, Payette, and similar formations. The native vegetation consists mostly of big sagebrush, rabbitbrush, bluebunch wheatgrass, and Sandberg bluegrass. Elevations range from 2,500 to 4,000 feet. Average annual precipitation is 8 to 10 inches, and mean annual air temperature centers around 47° F. Unit 60 soils are associated with Unit 56, 76, 79, 94, and 98 soils. Unit 60 soils are used for range. They have high potential for range seeding and are fairly well suited for irrigation where not too steep. The temperature limitation is mostly strong, ranging to moderate in northern Malheur County. Unit 60 soils are identified in slope categories 2-6 ranging from 3 to 60 percent slopes.

UNIT 83 SOILS
7% of all lands within fire (4,028 acres)
6% of BLM lands (3,286acres)

Unit 83 soils are shallow, very stony, well-drained soils over basalt, rhyolite or welded tuff. They occur on gently undulating to rolling lava plateaus with dome very steep faulted and dissected terrain. The vegetation consists mostly of Idaho fescue, bluebunch wheatgrass, Sandberg bluegrass, low sagebrush, and bitterbrush. Unit 83 soils occur at elevations mostly above 5,000 feet but they occur as low as 4,000 feet on north slopes in northern Malheur

County. Average annual precipitation is from 11 to 15 inches and mean annual air temperature centers around 43º F. Unit 83 soils are associated with Unit 75, 76, 82, and 84 soils. Unit 83 soils are used for range. They are too stony to be easily seeded and are unsuited for irrigation.

UNIT 84 SOILS
5% of all lands within fire (2,507 acres)
4% of BLM lands (2,331 acres)

Unit 84 soils are very shallow, very stony, rocky, well-drained soils over basalt, rhyolite, or welded tuff. They occur on gently undulating to rolling plateaus and very steep canyon lands and escarpments. The native vegetation consists mostly of low sagebrush, Idaho fescue, bluebunch wheatgrass, Sandberg bluegrass, and juniper. Elevations are mostly above 5,000 feet, but they may range as low as 4,000 feet on north slopes in northern Malheur County. Average annual precipitation is from 11 to 15 inches and mean annual air temperature centers around 43º F. Unit 84 soils are associated with Unit 76, S76, 77, 82, and 83 soils. Unit 43 soils are used for range, but their use is limited by stones, depth, and slope. They have little potential for range seeding and are unsuited for irrigation.

UNIT BROGAN (Br) SOILS (Brogan silt loam)
3% of all lands within fire (1,563 acres)
2% of BLM lands (1,342 acres)

The Brogan series consists of deep, well-drained soils derived from thin loess over old sediments. Slopes are dominantly steep to very steep. The native vegetation consists mostly of bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, and big sagebrush. Elevations range from 2,400 to 4,000 feet. Average annual precipitation is from 8 to 12 inches, and mean annual air temperature centers around 49° F. Brogan soils are used for range. They have potential for range seeding but are usually too steep for irrigation. The temperature limitation is moderate.

Biological Crust Description
Biological soil crusts (BSCs) such as mosses, lichens, micro fungi, cyanobacteria, and algae play a role in a functioning ecosystem, and are one of the potential indicators used in evaluating watershed function for uplands. In addition to providing biological diversity, BSCs contribute to soil stability through increased resistance to erosion and nutrient cycling (BLM Technical Reference 1730-2). Where native vegetation is dominant, BSCs are present and; conversely, where invasive, non-native species are present, especially mat forming annual grasses, BSCs are sparse or non-existent. Following wildfires, it has been documented that BSCs are reduced in abundance and occurrence (dependent on duration and intensity of the fire); however, when reseeded with native and/or desirable, non-native species, recovery and reestablishment would occur. When burned sites are invaded by invasive annual grass species such as cheatgrass and Medusahead, BSCs have been shown not to recover and reestablish (Hilty et. al. 2004).

Environmental Consequences

Effects Common to both Alternatives
Actions common to both alternatives are the continuation of grazing, fire rehabilitation activities, hunting and other recreational activities. The impacts of these activities will continue. Some of the consequences for the use of herbicides under both alternatives are listed below.

Biological Soil Crusts
Disturbance of soil crusts results in decreased soil organism diversity, nutrient cycling, soil stability and organic matter. Crust disturbance is typically mechanical, including fire. After disturbance, BSCs can take anywhere from one year to more than 50 years to recover depending on the species. Mosses and cyanobacteria are the first to recover and/or reestablish (approximately 1-5 years), while soil lichens take longer, sometimes more than 50 years and may not recover or reestablish at all.

Macro and Microorganisms
Herbicides probably affect few soil organisms directly (USDA 2004). The FEIS analyzed the environmental impacts to macro and microorganisms and this is herein incorporated by reference (USDI, 2010:178-188). The research is limited on the toxicity of many herbicides to most soil organisms. Of the seven herbicides considered in both alternatives: 2,4D, clopyralid, dicamba, glyphosate; have no or slight adverse effect to soil organisms, with some showing increases after herbicide treatments. There are no known studies for effects from imazapic to soil organisms. Little, if any studies have been conducted on bromacil. Of the studies that have been conducted, effects have been demonstrated but at application rates many times higher than typical rates proposed for use on Oregon BLM lands, or the decrease in soil organisms is temporary. Populations have increased in some situations (USDI, 2010:178)

If herbicides reduce macro and microorganisms, herbicides would persist in the soil longer as other means (e.g., hydrolysis) may become the primary breakdown mechanism. If invasive plants have changed the soil chemical or moisture contents in a manner that reduces the variety or overall amount of these organisms, herbicide persistence may be extended. Finally, disturbance from mechanical treatments or animal traffic particularly on wet soils could compact the surface layer to a point that these organisms would lose their ability to degrade the applied herbicides.

Fate of Herbicides in Soils
The Oregon FEIS analyzed the fate and effects of herbicides on soils and this is herein incorporated by reference (USDI, 2010: 181-185) for each of the seven herbicides. The ability of soils to hold and break down herbicides is affected by soil biological processes (organisms and plant uptake), physical parameters (adsorption, photo degradation, volatilization, hydrolysis, and leaching), and physical parameters (climate and vegetation cover). Characteristics of the 7 herbicides that influence the effectiveness of these parameters and processes are shown on Table 310.

Table 3.10: Fate of Herbicides in Soil

Herbicide	Soil Half-life (days)	Soil Adsorption (K_{oc})[1]	Fate in Environment (Persistence Rating[2] based on half-life)	SPISP II[3] Ratings (potential)		
				PLP[4] (Leaching)	SRP[5] (Solution Runoff)	PARP[6] (Adsorbed Particle Runoff)
2,4-D	10	20 m / g (acid / salt) 100 mL / g (ester)	Rapid microbial degradation 1-4 weeks (Non-Persistent)	Intermediate	Intermediate	Intermediate
Chlorsulfuron	40	40 mL / g	Relatively rapid degradation by microbial and chemical actions, trace amounts have extreme bioactivity (Moderately Persistent)	High	High	Intermediate
Clopyralid	40	6 mL / g, ranges to 60 mL / g	Biodegradation is rapid in soil, reducing the potential for leaching or runoff. Degraded primarily by microbial metabolism. It is resistant to degradation by sunlight, hydrolysis, or other chemical degradation. It is water-soluble, does not bind strongly with soils, and has the potential to be highly mobile in soils, especially sandy soil. It is not highly volatile. Possible release of herbicide from decaying plants with uptake by other plants (Moderately Persistent)	High	Intermediate	Low
Dicamba	14	2 mL / g	Mobile in soil but is easily degraded by microbes (Non-Persistent)	High	Intermediate	Low
Glyphosate	47	24,000 mL / g	Tightly adsorbed to soil and rapidly degraded by microbes, thus no soil activity (Moderately Persistent)	Very Low	Intermediate	Low
Picloram	20-300	16 mL / g	Very slow microbial degradation and some photo-decomposition. Picloram is persistent for a year or more (Moderate to Persistent)	High	High	Intermediate
Imazapic	120 to 140	137 mL / g	Most imazapic is lost through bio-degradation. Sorption to soil increases with decreasing pH and increasing organic matter and clay content (Persistent)	Intermediate	Intermediate	Low

1. K_{oc}: Soil organic carbon sorption coefficient of an active ingredient in mL / g. For a given chemical, the greater the K_{oc} value, the less soluble the chemical is in water and the higher affinity the chemical has for soil organic carbon. For most chemicals, a higher affinity for soil organic carbon (greater K_{oc}) results in less mobility in soil.
2. Persistence based on half-life - non persistent: less than 30 days; moderately persistent: 30 to 100 days; and persistent: greater than 100 days (defined by Extoxnet Pesticides)
3. SPISP II = Soil Pesticide Interaction Screening Procedure version II
4. PLP - Pesticide Leaching Potential indicates the tendency of a pesticide to move in solution with water and leach below the root zone. A low rating indicates minimal movement and no need for mitigation.
5. SRP - Pesticide Solution Runoff Potential indicates the tendency of a pesticide to move in surface runoff in the solution phase. A high rating indicates the greatest potential for pesticide loss in solution runoff.
6. PARP - Pesticide Adsorbed Runoff Potential indicates the tendency of a pesticide to move in surface runoff attached to soil particles. A low rating indicates minimal potential for pesticide movement adsorbed to sediment, and no mitigation is required.

Alternative A: No Action

Of the herbicides included in the No Action Alternative only two (glyphosate and picloram) are generally tightly adsorbed to soil. Glyphosate is rapidly degraded by microbes. Picloram can be persistent in the soil, which is very helpful if the objective is to treat the following years' emerging seedlings but increases the risk of movement offsite (2010 FEIS).

Biological Soil Crusts

Currently, there is very little information on the effects of herbicides on biological soil crusts. One study addressed the effects of glyphosate on moss-dominated biological soil crusts and determined there were no short-term adverse effects on bryophyte cover (Youtie et al. 1999). This research noted that there is little information on repeated applications or long-term effects from glyphosate or other herbicides. Various laboratory studies have been done on individual algae species present in soil crusts; however, only a handful of the studies focused on herbicides that the BLM is proposing, and of those, results were variable. Beneficial, neutral, and adverse effects were attributed to 2,4-D; neutral and adverse effects were attributed to picloram; and, beneficial effects were attributed to 2,4-D + picloram (Metting 1981). Metting cites several authors who caution against extrapolating this controlled laboratory studies information to the field.

Macro and Microorganisms:

Herbicides affect few soil organisms directly (USDA 2004). However, there is only limited research on the toxicity of many herbicides to most soil organisms. Herbicides in this Alternative (2,4-D, picloram, dicamba, and glyphosate), have no or slight adverse effect on soil organisms, with some organisms showing increases after herbicide treatments.

Under the No Action Alternative, weed control would proceed with the existing approved chemicals, along with manual treatments (grubbing). Soil stabilizing measures resulting from natural recovery would not occur as rapidly as under the proposed action alternative. Re-establishment of invasive annual grasses would aggressively compete with limited soil resources and is expected to be utilized for invasive grasses as opposed to natural recovery of native species, including soil crusts and soil organisms. Shortened fire return intervals would result and a cycle of negative impacts are expected to be exacerbated. With the loss of top soil and BSCs, there would be an increase in invasive and noxious weed species which could trend the site towards becoming annual grassland.

Alternative B: Proposed Action

Under the Proposed Action, there will be an addition of three approved chemicals (imazapic, chlorsulfuron and clopyralid) analyzed in the PEIS and Oregon FEIS. All seven chemicals would available for use under the Proposed Action. See the No Action alternative discussion of impacts for the available information on those four approved chemicals.

Impacts to Biologic Soil Crusts and Soil Macro- and Microorganisms are addressed in the Oregon FEIS (USDI, 2010:178-188) and are herein incorporated by reference.

In a recent study, a statistically significant association was found between glyphosate and lower frequencies of biological soil crusts (0.03 compared to a control mean of 0.15). The same study found no evidence for association between picloram (0.16) or imazapic (0.11) and diminished biological soil crusts (Von Ries, 2015).

Herbicides were found to affect few soil organisms directly (USDA 2004). However, there is only limited research on the toxicity of many herbicides to most soil organisms. There are no known studies for effects from imazapic to soil organisms.

Herbicides proposed for use, (chlorsulfuron, and picloram), have some adverse effect on soil organisms, generally reducing but not eliminating local populations for a limited period.

The additional benefit of broadcast aerial treatments to reduce the presence and competition of invasive annual grasses would positively impact the recovery of the burned area, providing a competitive advantage for revegetation of native forbs, shrubs, and perennial grasses, which is expected to enhance recovery of soil crusts and organisms.

Of the herbicides included in this alternative, only imazapic has the potential for application over large areas. Standard Operating Procedures reduce the potential for soil erosion from these treatment areas. The smaller (spot and small site) application extents common to the other herbicide applications are not likely to contribute to wind or water erosion and subsequent transport of herbicides off site. Few known sites are on highly erodible wind sites. Therefore, adverse effects from erosion or herbicide transport off-site are unlikely.

The addition of the three proposed additional herbicides (imazapic, chlorsulfuron and clopyralid) have a wider treatment window, allowing flexibility in application to plant species and timing of treatments. Soil stability would increase the potential for the reestablishment and expansion of biological soil crusts.

Impacts to soils would be negligible from herbicides. Any short term impacts to soils or biological soils crusts would be outweighed by the long term benefits of herbicides on noxious and invasive weeds by allowing native and non-native desirable vegetation to establish, stabilize soils and provide habitat.

Inventory and Monitoring

By following appropriate protocols inventory and monitoring would have no impacts on soils or biological soil crusts.

Cumulative Effects

The Cumulative Effects Analysis Area (CEAA) for soils and BSCs is the Bendire Complex fire project area. The ongoing and RFFA impacts to soils and crusts on the BLM-managed land are livestock grazing, hunting and other recreational activities. Other foreseeable actions include ongoing ESR and restoration fuels reduction and sagebrush restoration efforts. Limited soils impacts may occur along the route of a proposed ORTELCO underground fiber optic line proposal. Impacts by livestock would be temporarily mitigated by removal until objectives are met. Impacts by invasive species, in particular mat-forming annual grasses, would inhibit stabilization of soils, decrease recovery of BSCs and establishment of desirable native and non-native plant species. The use of the additional chemicals will reduce the amount of volatile and mat forming annual species. Any short term impacts to soils or biological soils crusts would be outweighed by the long term benefits of herbicides on noxious weeds and invasive annual grasses by allowing native and non-native desirable vegetation to establish, stabilize soils and provide habitat.

Emergency stabilization measures would inhibit the emergence of annual invasive grasses and assist in increased establishment rates of native and desirable non-native plant species. This

would assist in the stabilization soils and increase the opportunity for soil crusts and micro/macro-organisms to naturally establish and/or expand. Restoration of native conditions are expected to benefit greatest through the proposed action alternative.

Fire and Fuels Management

Affected Environment

Sagebrush plant communities within the lower elevation sagebrush communities in the Bendire Fire were historically made up of Wyoming sagebrush, separated by native forbs and bunchgrasses that retained moisture long into the dry summer season and existed in discontinuous bunches, often separated by areas of soil crust. Historically, fire was the dominant disturbance within this ecological community and fire return intervals in this type varied between 30-120 years for a stand replacement fire (Howard, 1999). Due to the large expansion of the invasive annual grasses, medusahead and cheatgrass, much of the plant community that exists on lands administered by BLM in area of the Bendire Fire is in a degraded state and is at risk of conversion to invasive annual grassland.

Higher elevation mountain big sagebrush plant communities and other types such as riparian communities are invaded by the same invasive annual grass species to a lesser extent. Mountain big sagebrush rangeland communities typically had fire return intervals of every 10 – 40 years near the ponderosa pine ecotone during the pre-contact period (Burkhardt and Tisdale 1976). The condition of these communities in the Bendire fire is estimated to remain in a perennial herbaceous state although additional fire disturbances could cause invasive annual grasses to spread and the condition could decline to a degraded state.

Invasive annual grasses such as cheatgrass and medusahead can increase horizontal fuel continuity and create a fuel bed more conducive to fire ignition and spread. Invasive annual grasses within warm-dry sagebrush community types have been shown to increase fire frequency and size as well as expand the seasonal window of burning (Zouhar et al. 2008). These grasses have increased fuel continuity across large areas of contiguous landscape, supporting more frequent and more intense fast-moving fires that are initially difficult to contain and result in large landscape fires. Since 1980, roughly 3 million acres on the Vale District have been burned by wildfire. This represents an average of 4.5 times the amount of acres burned during any other 10-year period prior to 1980. This increase in wildfire has allowed invasive annual grasses a competitive advantage that results in an unnatural fire regime; a more natural fire regime would be associated with a native plant community.

Increases in fire risk, fire size, and fire severity were determined by USFWS (2013) to be a primary causal factor in the loss of habitat and the decline of Greater sage-grouse populations throughout the Great Basin.

Environmental Consequences

Alternative A: No Action
Under the No Action Alternative, no aerial applications of imazapic would occur in the Bendire Fire area. Few treatments would occur in the burned area because no herbicide is available District-wide under the No Action Alternative that is selective for the invasive annual grasses. Glyphosate is sometimes used in high-priority invasive grass monocultures where there are few desirable native species to suffer collateral damage; such treatments may be used to partition large expanses of invasive annual grass monocultures, but otherwise does little to inhibit increasing densities or over broad areas.

Invasive annual grass species would likely continue to invade Wyoming sagebrush plant communities and would increasingly threaten higher elevation mountain big sagebrush communities. The fire-annual grass cycle in the area would continue to accelerate and additional priority sage-grouse habitat would be at risk of loss in a future event. A re-burn fire event in the current perimeter would likely be of larger size and intensity without intervention by chemical herbicide.

Alternative B: Proposed Action
If invasive annual grasses were treated with herbicide over the next 5 years within and adjacent to the Bendire Fire perimeter, annual grass cover would decrease across the warm-dry and cool-moist sagebrush landscapes.. Using herbicides in this context would set the stage for future stabilization, burned area rehabilitation, and restoration to occur. It would provide an opportunity to return fire frequency and intensity within natural, historic ranges of variation within treatment areas, which would be beneficial and improve the ability to manage wildfires in the long-term. Herbicides that would be available under this alternative include pre-emergents (e.g. imazapic) that would selectively control invasive annual grasses including cheatgrass and medusahead rye. Future treatments such as seedings and shrub seedling planting would be more likely to succeed with the reduction in invasive annual grass cover across the burned area. This treatment would help to reduce the risk of faster moving fires by breaking up the fuels continuity, modifying rates of spread and fire intensity which would allow for safer fire suppression actions, and allow for multiple fire suppression options. Greater suppression capability in the area would result in greater retention of priority greater sage-grouse habitat during future wildland fire events.

Cumulative Effects
Treatment of invasive annual grasses in combination with hazardous fuels management (such as constructing and maintaining fuel breaks, and aerial imazapic treatments) in future phases of Bendire ESR and the Northwest Malheur Habitat Restoration project, would reduce the risk undesirable environmental effects from wildfires. These types of treatments in combination should reduce potential flammability, slow potential rates-of-spread under all but extreme burning conditions, and increase the probability of reducing potential fire size, thereby reducing risks of adverse effects to a wide variety of environmental and social / economic factors, reducing potential risk to firefighters and public, and in the long term, reducing the overall cost of fire suppression.

In addition, the combination of these treatments should increase resistance to climate change by reducing the potential frequency, intensity, and severity of wildfires in the headwaters of Bully Creek and Little Malheur River watershed. Many studies have documented that the most rapid environmental changes arising from changing climate occur following a stand-replacing disturbance, such as wildfire, since established vegetation typically can tolerate greater climate variability than seedlings can tolerate.

Without the ability to treat invasive annual grasses, the potential for large landscape altering wildfires will persist or intensify with the spread of invasive annuals. Following a wildfire, ecosystems are prone to conversion to annual grasslands, loss of key ecosystem functions, and reduced habitat for wildlife.

Upland Vegetation

Affected Environment

There are multiple types of vegetation that are within the Bendire Fire project area. The following provide a general understanding of the current environment.

Big sagebrush shrub / grasslands

Plant community dominated by one of three subspecies of big sagebrush: Wyoming big sagebrush (Artemisia tridentata ssp. wyomingensis), mountain big sagebrush (A. tridentata ssp. vaseyana), or basin big sagebrush (A. tridentata ssp. tridentata). These communities occur as a mosaic with other shrub-steppe communities over much of the foothills and valley floors. Native grasses range from rare to abundant, depending on site history and soil / water relationships. Native perennial bunchgrasses include bluebunch wheatgrass (Pseudoroegneria spicata), Sandberg's bluegrass (Poa secunda), Idaho fescue (Festuca idahoensis), Great Basin wildrye (Leymus cinereus), junegrass (Koeleria macrantha), needle- and-thread grass (Achnatherum hymenoides), Thurber's needlegrass (Achnatherum thurberianum), western needlegrass (Achnatherum occidentale), and, in more disturbed areas, bottlebrush squirreltail (Elymus elymoides). Non-native grasses are primarily invasive annual cheatgrass (Bromus tectorum) and planted perennial crested wheatgrass (Agropyron cristatum).

Low and black sagebrush shrub / grassland

Low sagebrush (Artemisia arbuscula) communities are found throughout eastern Oregon, generally on areas with shallow, clayey soils of basalt origin. Sandberg's bluegrass is the most common grass. Other associated grasses are bluebunch wheatgrass, Idaho fescue, and bottlebrush squirreltail. Low sagebrush is usually the dominant vegetation in shallow soil and soils with an impervious layer that excludes the root formation of big sagebrush and other shrub types. The sites have extensive areas of exposed rock and often do not have enough vegetation to support wildland fires. These areas are often rich in forbs. Black sagebrush (Artemisia nova) communities are similar to low sagebrush in shrub height, soil depth (shallow), dominant grass, and sparse vegetation that typically does not carry a fire

Miscellaneous shrub / grassland

Usually consists of mountain mahogany (Cercocarpus ledifolis), bitterbrush (Purshia tridentata), and snowberry (Amelachier sp.) communities with bunchgrass understory; they are often found on steep slopes or in association with western juniper (Juniperus occidentalis).

Western juniper woodland

Areas of open-canopy woodland with western juniper as primary tree species; understory vegetation often includes sagebrush species, bunchgrasses, and forbs. Relict old growth juniper is primarily confined to rocky surfaces or ridges, or pumice sands with sparse vegetation and infrequent fires. Juniper has also expanded its historic range into sagebrush habitats, riparian areas and the lower edges of Ponderosa pine forests

Prior to the fire, a large portion of the project area was visited by an ecological site inventory ecologist and a soil scientist in preparation for potential future projects. During these visits field notes indicate vegetation in the majority of the project area was based upon an annual precipitation of 9-12 inches with variable soils and a vegetative climax community of Bluebunch Wheatgrass on the south slopes, Idaho Fescue & Bluebunch Wheatgrass on the north slopes, and multiple flats containing a mix of both species. These areas contain a scattering of juniper and average of about 10% annual grass cover. Sub-zones encountered during these visits also noted an annual grass cover in excess of 10%, in these areas treatments of annuals was recommended.

An additional portion of the area was noted as averaging an annual precipitation of 10-14 inches. These areas contained chiefly moderately deep soils and a climax vegetative community consisting of scattered old growth juniper, less than five trees per acre with a few younger invasives. Perennial grasses consist of Bluebunch Wheatgrass, Idaho Fescue, needle and thread, Thurber's, and Poa greater than 5% cover. Shrubs include Bitterbrush, Basin Big Sage, Mountain Big Sage and pockets of Little Sagebrush. Annual invasive grasses in these areas were generally less than 2%.

In 2012 the Bonita & Ironside Fires burned through the northeastern half of the proposed project area. Due to the lack of available resources these areas were left to recover naturally. Since this time monitoring in the old fire area indicates the annual grasses (mainly cheatgrass) have grown in percentage of the vegetative composition from an estimated 5%-10% to over 30%. As the Bendire Fire burned through the same area, the percent of annual grasses is expected to increase as they out compete and gain dominance over the native perennial vegetation.

As annual species increase in density, the diversity of plant communities and the abundance of native species would decrease (Davies 2011). Following fires, resource availability increases on the site, including an increase in available nitrogen, which annual species are able to utilize quicker than perennial species (Davies et al. 2007, Monaco et al. 2003, Pellant 1996). This is especially true in the early spring since annual grasses begin actively growing while perennial species are still dormant or just beginning to initial growth (Pellant 1996).

Medusahead rye is a winter annual that has invaded and replaced dense stands of cheatgrass, particularly in response to fire over large areas in California, Idaho, Oregon, and Washington during the past 40 years (Young and Evans 1977). It increases under frequent fires at the expense of native species. Cheatgrass is a winter annual that dominates approximately five million acres BLM administered lands in Oregon (USDI BLM 2010). Infestations of cheatgrass have increased dramatically within the last twenty years. Regionally, both cheatgrass and medusahead show signs of continuing on a successional trajectory toward permanent conversion of some rangeland communities to annual grassland in the absence of restorative management.

All of the areas visited by BLM specialists have cheatgrass and/or medusahead present to some extent and that affects their resilience to disturbance. Annual grass dominance alters ecosystem processes (D'Antonio and Vitousek 1992). Once annual grasses becomes dominant on a site, they create a bed of fine fuels, which can cause the fire cycle to increase to as often as every three to five years, perpetuating annual grass dominance and killing native perennial species (Whisenant 1990,). The ecological zone most at risk to the impacts of the "annual grass-wildfire cycle" is the low elevation ecological zone although a low density of cheatgrass and isolated pockets of Medusahead throughout the middle elevation zone suggest that these communities are also at some risk of losing native perennial species and continuing a trajectory toward converting to an annual grassland (Peters and Bunting 1994; Pellant 1990).

The Interdisciplinary Team assembled for the Bendire Fire toured the area and saw a number of plant communities throughout the burn that were in good condition. However, upon visiting areas where burn severity and intensity was greatest, the team noted indicators that the resources were at risk of conversion from a big and/or low sagebrush dominated ecosystem to annual grassland. Upon review, areas where previous fire activity had occurred displayed similar indication of conversion, specifically fewer perennial root crowns, and a lack of residual or burnt sage stems. The observations and conclusion of the ID Team is supported by the following citations:

Fire has played a limited role in the development of these big and low sagebrush plant communities. Historic fire return intervals, average number of years between fire events, were probably between 35 and 50 years at higher elevations. This is in contrast to lower elevation sagebrush plant communities where fire return interval was more than 75 years. However, the increased fuel continuity provided by introduced annuals (cheatgrass) have also established and are just beginning to dominate or co-dominate the plant communities in the lower elevations increasing the frequency and intensity of fires.

The introduction of cheatgrass and Medusahead into the Great Basin and Upper Columbia River Basin has upset the ecological balance. Ecological processes such as energy flow, nutrient and hydrologic cycles, and structure and dynamics, result in fauna and flora having been adversely affected. In addition to the ecological implications associated with cheatgrass invasion, the impacts to land uses in the area are also significant (Pellant 1996).

Annual grass dominance alters ecosystem processes (D'Antonio and Vitousek 1992). Once annual grasses becomes dominant on a site, they create a bed of fine fuels, which can cause the

fire cycle to increase to as often as every three to five years, perpetuating annual grass dominance and killing native perennial species (Whisenant 1990, Davies and Svejcar 2008, Pellant et al. 2004, Knapp 1996, Chambers et al. 2007).

As annual species increase in density, the diversity of plant communities and the abundance of native species would decrease (Davies 2011). Following fires, resource availability increases on the site, including an increase in available nitrogen, which annual species are able to utilize quicker than perennial species (Davies et al. 2007, 1996, Monaco et al. 2003, Pellant 1996). This is especially true in the early spring since annual grasses begin actively growing while perennial species are still dormant or just beginning to initial growth (Pellant 1996).

The risk of weed invasion increases in relation to increases in available resources. In areas with Wyoming big sagebrush (low elevations), water availability is often very variable; cheatgrass is able to take, grow and reproduce better than perennial species under these conditions. However, annual grasses are weak competitors against established perennial grasses (Chambers et al. 2007, Davies 2008,). The establishment of perennial grasses in areas at risk for annual grass invasion, such as Wyoming big sagebrush sites, is essential to ensure ecological processes are maintained and prevent the site from becoming dominated by annual grasses (Davies 2008,.

The biotic communities most at risk to the impacts of the "annual grass-wildfire cycle" are the Wyoming big sagebrush and more mesic salt desert shrub plant communities (Peters and Bunting 1994; Pellant 1990). Not only is cheatgrass adapting to new environments, it is now being invaded by other noxious weeds (Pellant 1996). In the western United States, big sagebrush (*Artemisia tridentata*) steppe communities dominate approximately 60 million hectares (148 million acres) and comprise the largest vegetation type (Wambolt and Hoffman 2001). However, due to the invasion of exotic plants, fire has become a driving force in the ecology and management of sagebrush steppe communities. The high variability in cover and density of shrubs indicates the complexity of factors influencing recruitment and establishment of sagebrush from both natural populations and from artificial seeding (Lysne and Pellant 2004). If current sagebrush restoration efforts do not result in a more consistent establishment and persistence of this important shrub, large areas of sagebrush-steppe may be lost, and rehabilitation may no longer be a viable option (West 2000).

In 2007, it was estimated that more than 40 percent of sagebrush systems were at a moderate to high risk of becoming dominated by cheatgrass. Pellant and Hall (1992) considered annual grasses to be dominant and in a monoculture when they made up 60 percent or more of the species composition by weight.

Environmental Consequences

Alternative A: No Action

Under the No Action alternative, without the imazapic treatments, areas vulnerable to invasion from invasive annual grasses, including medusahead, could trend the entire area within the burn perimeter towards becoming annual grassland, thereby increasing the fire return interval. The increased fire return interval could then trend the area, within the fire perimeter and directly adjacent, towards a fire intolerant system.

Treatment for noxious weeds using currently authorized herbicides (glyphosate, 2,4-D, picloram and dicamba) would still be permitted. However, glyphosate, would be the only available choice for invasive annual grass treatments. Because it is not selective to annual grasses, cannot be applied aerially, and can only be applied to listed noxious species under this alternative, cheatgrass could not be treated and glyphosate's usefulness for treating medusahead and ventenata would be limited to small, select sites. Unless those sites were monocultures of annual grasses, there could be some unintended mortality on non-targeted vegetation. Most treatments on noxious weeds using the other three herbicides are performed at a spot treatment level. Therefore, any non-target mortality accompanying these treatments would be negligible when evaluated at the project level. Noxious weeds would out-compete the perennial vegetation if left untreated (12% annual spread). Neither picloram, 2,4-D or dicamba are effective on some perennial species, especially whitetop and perennial pepperweed. These species would likely not be treated and thus continue spreading.

The inability to use the more effective herbicides listed in the Proposed Action could impair the success of seedings within the project area due to the competition presented by the annuals.

Alternative B: Proposed Action

Under the Proposed Alternative, imazapic would be primarily applied as a pre-emergent to invasive annual grasses when native plants are dormant in fall. At the low rates used to select for invasive annual grasses, imazapic poses a low risk to other terrestrial plants. At the maximum rate, imazapic poses a moderate risk to non-target terrestrial forbs and some grasses. Terrestrial plants are not at risk from off-site drift, surface runoff or wind erosion of imazapic. When used to control invasive annual grasses, imazapic did not affect perennial forb cover. However, it reduced the cover of native annual forbs, and Sandberg's bluegrass (Poa secunda) for at least three years post-treatment (Pyke et al. 2014).

Susceptibility of native perennial plants as adults or seedlings is unknown for many species and soil types; thus, there is some uncertainty about the retention of native perennials when this herbicide is used as a selective herbicide for annual grasses, and about the success of revegetation efforts immediately following herbicide applications. Native annual plants, if they emerge at the same time as invasive annual grasses, may be susceptible and harmed by imazapic applications (Pyke 2011). Imazapic applied to reduce cheatgrass fuel continuity has been successful and has not reduced some perennial grasses (Shinn and Thill, 2004). Imazapic used at low rates (typically 6 oz. per acre) would reduce invasive annual grass cover and fire risk in the sagebrush steppe, forest, and woodland communities

The Proposed Action would enable the selective treatment of medusahead, cheatgrass and ventanata in sagebrush steppe and other native plant communities. In areas recently burned by wildfire, treatments with imazapic would give residual native perennials the opportunity to recover and regrow before the invasive annual grasses re-establish. The majority of the herbicide use under this alternative to treat invasive annual grasses would be imazapic. Most native perennial bunch grasses are tolerant to imazapic at typical rates. Due to the potentially large treatment areas, uneven terrain and changing topography, imazapic would primarily be

applied aerially to assure a consistant rate of application across all acres treated. Since imazapic is an herbicide selective mainly for annual grasses and annual weedy species, the effect of aerial spraying on non-targeted native vegetation would be negligible. However, some native annual forbs and grasses could be impacted temporarily. The BLM would have effective herbicides to reduce the threat of recently burned areas being infested with invasive annual grasses.

Under this alternative, use of the four herbicides available in the No Action Alternative would decrease and herbicides generally less toxic to various classes of plants would be used. The use of picloram would decrease by 30 percent, primarily in favor of clopyralid. The use of 2,4-D would decrease 60 percent, primarily with the addition of chlorsulfuron. Having more herbicides provides more opportunity to select one less likely to damage adjacent desirable plants and one that is more efficacious on select species resulting in less retreatments, further reducing the likelihood of adverse effects described above for each herbicide. With more target-effective herbicides, plants such as whitetop species, perennial pepperweed and cheatgrass could be controlled, and restoration actions would have more potential for success.

Cumulative Effects

The Cumulative Effects Analysis Area (CEAA) for upland vegetation is performed at the project level. Past, present and future foreseeable activities within the area include:

Past Actions: Historic grazing, juniper cuts for fuels reduction, Vale Project seedings and chemical applications (2 4-D), Bonita & Ironside fires (2012), 2015 imazapic treatment & treatment of noxious weeds.

Present Actions: Manage livestock grazing, temporary fencing, sagebrush seedings, bitterbrush and squaw apple plantings, aspen exclosures, straw waddles for erosion control, noxious weed treatments, hunting, recreational activities & road maintenance.

Future Forseeable Actions: NW Malheur Fuels Reduction Project, Ortelco fiber optic line, BLM Bully Cr juniper fuels treatments, NRCS Bully Cr juniper fuels treatments on private lands, continued grazing, continued noxious weed spot treatment.

Future fuels treatments and juniper cuts will have a net beneficial impact on native vegetation and seedings by reducing fuels. A reduction in fuels will help reduce the fire return interval and severity, directly reducing future mortality on desired perennial vegetation. It is anticipated that with the reduction in fuels, future fires occurring in these areas will be easier to contain, thus resulting in smaller acreages burned, greater land health and resiliency, and less forage lost.

Linear easements and rights of way for future utilities (Ortelco) contain BMPs that directly address reseeding over disturbed areas, as well as monitoring and treatment for invasive annual grasses and noxious weeds. Impact to upland vegetation in the form of vegetation loss will be insignificant.

Historic and unmanaged livestock grazing occurred on the Vale District for decades and has resulted in changes in plant communities in the sagebrush steppe. Although grazing has a

direct effect on herbaceous plants through selective cropping of palatable plants, trampling, deposition of urine and feces, and soil compaction, management is applied to facilitate meeting the Standards for Rangeland Health. These standards were last evaluated in the Bully Creek and N. Fork Malheur watersheds in 2000 & 2007 respectively. Changes in season of use were implemented to assist in making substantial progress towards meeting the required standards for rangeland health. Past and reasonably foreseeable future actions that continue to monitor and evaluate conditions of the rangeland, and base changes in management on land health, are expected to result in long-term beneficial effects to upland vegetation.

All of the past and present actions have combined to become the conditions described in the affected environment section. When combined with the Future Foreseeable Actions there could be a short term negative affect to upland vegetation if non-target species receive treatments, however the treatment of invasive annual grasses and noxious weeds would provide native and desirable non-native upland vegetation the best opportunity to recover by limiting expansion of invasives and decreasing competition for available nutrients and soil moisture. Established desirable upland vegetation recovery would trend the area within the project boundary back towards pre-fire conditions. Invasive annual grass and noxious weed monitoring mandated through design features for future actions, combined with additional project funding sources for EDRR, would limit the potential for expansion and would provide a net benefit to upland vegetation as they would become healthier, resilient, and more productive vegetative communities.

Wilderness Inventory Units and Wilderness Study Area

The Bendire Fire burned through a portion of one Wilderness Study Area (WSA), Beaver Dam Creek, and through small areas of two Wilderness Inventory Units (WIU) that meet minimum Wilderness Act criteria: Indian Creek and West Fork. See the following tables which provide a summary of the Wilderness Criteria and area that was burned.

Table 3.11: Summary of WSAs and Wilderness Inventory Units

Name	Total Size of WSA/WIU (acres)	Wilderness Criteria Met (Yes/No)?				
		Size	Naturalness	Recreation	Solitude	Supplemental Values?
WSA						
Beaver Dam Creek	19,580	Y	Y	Y	Y	Y
Wilderness Inventory Unit						
Indian Creek	18,415	Y	Y	N	Y	N
West Fork Bendire	10,519	Y	Y	Y	Y	Y

Table 3.12 - Summary of Total Acres in Comparison within Affected Areas within WSA and Wilderness Inventory Units

NAME	Total Acres within WSA or WIU	Acres Burned within WSA or WIU	% of WSA or WIU Burned
Beaver Dam Creek WSA	19,580	795	0.0406
Indian Creek	18,415	336	0.018
West Fork Bendire	10,519	14.2*	0.0001

Acres burned in West Fork Bendire WIU are mostly data error of fire perimeter data or minor cross-road fire movement. Actual proposed actions in West Fork Bendire would be very limited (spot treatments), if any.

Under the 1976 *Federal Land and Policy Management Act* (FLPMA), the BLM has numerous authorities to maintain inventories of all public lands and their resources, including wilderness characteristics, and to consider such information during the land use planning process. BLM Manual 6310 provides guidelines to assess public lands for wilderness characteristics that are not currently managed for such characteristics (that is, lands other than existing designated wilderness areas and wilderness study areas (WSAs)).

Such assessment is based on determining whether certain roadless tracts of public land meet minimum Wilderness Act criteria, as follows:

- At least 5,000 acres in size <u>or</u> adjacent to other existing designated wilderness areas or wilderness study areas, <u>and</u> contain the following wilderness characteristics
- Generally natural in appearance, <u>and has either</u>
- Outstanding opportunities for solitude, <u>or</u>
- Outstanding opportunities for primitive and unconfined recreation.

Additional supplemental values that are associated wilderness values are also recorded during the assessment but are not a determining factor for wilderness characteristic findings. The assessment reflects current conditions and was used to update wilderness inventories.

The process entails the identification of wilderness inventory units, an inventory of roads and wilderness characteristics, and a determination of whether or not the area meets the minimum Wilderness Act criteria (listed above). Units found to possess such characteristics are being evaluated during the land use planning process in order to address future management. The following factors are documented for each WIU:

> **Naturalness** — Lands and resources exhibit a high degree of naturalness when affected primarily by the forces of nature and where the imprint of human activity is substantially unnoticeable. An area's naturalness may be influenced by the presence or absence of roads and trails, fences or other developments; and the nature and extent of landscape modifications.

Outstanding Opportunities for Solitude or Primitive and Unconfined Types of Recreation — Visitors may have outstanding opportunities for solitude or primitive and unconfined types of recreation, when the sights, sounds, and evidence of other people are rare or infrequent; where visitors can be isolated, alone or secluded from others; or where the area offers one or a combination of exceptional non-motorized, non-mechanical recreation opportunities.

Supplemental Values — does the area contain ecological, geological, or other features of scientific, educational, scenic, or historical value?

Wilderness Inventory Updates

In February 2004, a citizen group provided the BLM Vale District with an inventory report containing maps, photos, and photo logs for 42 proposed new wilderness study areas (WSAs) "additions" or wilderness areas of critical environmental concern covering over 2.2 million acres of public land in the planning area (ONDA, 2004). The group later submitted supplemental sets of digital photos, photo logs, and geographic information systems spatial data with additional or edited versions of their original submission from between 2007-2012 the BLM Vale District conducted wilderness inventory updates for public lands outside of designated WSAs (approximately 1.3 million acres in the planning area), following current inventory guidance. Interdisciplinary (ID) teams reviewed the existing wilderness inventory information contained in the BLM's wilderness inventory files, previously published inventory findings, and citizen-provided wilderness information.

The BLM identified preliminary boundaries for Wilderness Inventory Units and reviewed existing pertinent information within the unit to determine if data updates or additional field inventory information was needed. Updates and inventories were completed prior to conducting an evaluation of a given unit. Inventory unit boundaries are principally formed by public land boundaries and roads. The ID teams made final route and boundary determinations and, subsequently, evaluated wilderness characteristics in each unit. BLM staff compiled the new and existing photography, resource information, ID team discussion records, and route information into individual unit records. With this information, the ID teams then made draft wilderness characteristic determinations and provided these to BLM managers for final concurrence. This process is documented in further detail in USDI-BLM (2011c). Final wilderness character determinations have been made available to the public on the BLM Vale District website at:

http://www.blm.gov/or/districts/vale/plans/wce/malheur-index.php

Wilderness Study Area and Wilderness Inventory Units

Beaver Dam Creek – OR-3-27

The Beaver Dam Creek Wilderness Study Area (WSA) (OR-3-27) is located in Malheur County, Oregon, approximately 14 miles south of the town of Ironside and US Highway 26. The WSA includes 19,140 acres of BLM lands and 440 acres of split-estate lands in two

parcels. The WSA is roughly horseshoe shaped, with boundaries composed of high standard dirt roads and adjacent private land. Private land represents over 50 percent of the WSA's boundary. Adjacent private parcels along Bully Creek account for the WSA's horseshoe configuration. A one-mile dead-end road that terminates at Kitten Canyon Reservoir enters the WSA from the east, forming part of the boundary.

The WSA has a complex, mountainous appearance due to numerous ridges and draws. This is most prevalent in the north-central portion of the area. The highest point, located in the northern portion of the WSA, is in the vicinity of Sheep Rock at 5, 902 feet. Numerous intermittent and perennial drainages empty into Bully Creek, which runs through mostly private land near the middle of the WSA.

Lands with Wilderness Character – Wilderness Inventory Update (2006-2012)
Indian Creek (Unit OR-034-036) inventoried area according the wilderness criteria forms (available at http://www.blm.gov/or/districts/vale/plans/files/IndianCreek_OR-034-036_ALL.pdf), meets the minimum of 5,000 acre size requirement. The unit is 18,415 acres. Vegetation is predominately of sagebrush community with native and non-native rangeland grasses with some presence of scattered juniper. The unit consists of a multi-series of drainages and separating ridges associated with South Fork and North Fork Indian Creek and of the Gregory Creek watershed. The unit offers outstanding solitude due to its varied topography but does not offer outstanding opportunities for primitive and unconfined recreation opportunities. The unit does not have supplemental values.
West Fork Bendire (Unit OR-034-007) inventoried area according the wilderness criteria forms (available at http://www.blm.gov/or/districts/vale/plans/files/WForkBendire_OR-034-007_ALL.pdf), meets the minimum of 5,000 acre size requirement. The unit is 10,519 acres. The unit's elevation ranges from 3,460 to 6,120 feet. Vegetation consists of predominately of sagebrush and both native and non-native grasses. The unit topographic dynamic and the unit's size offers solitude. The dispersed recreational opportunities are considered outstanding in quality when they are combined. The unit has supplemental values because all but a small portion of the eastern-most extent within the Castle Rock ACEC.

Environmental Consequences

Effects Common to Both Alternatives
The effects of restoring of the existing range improvement projects, seeding and treatments would have no negative effect to the above WSA and WIU units. The following table presents a summary of the proposed action.

Table 3.12: Emergency Stabilization and Rehabilitation Activities in WSA/WIU in the Bendire Project Area

WSA or Wilderness Character Inventory Unit Name	Historically Seeded prior to WC or WSA Inventory?	Seeding/Treatment proposed?	Improvements Proposed
Beaver Dam Creek WSA	Yes	No	None
Indian Creek	Yes	Yes	Seeding & Chemical treatment; Fence repairs & temporary fence installation
West Fork Bendire	Yes (chemical)	No	No

Treatments proposed in lands determined to have wilderness character were selected to maintain, protect and/or enhance values identified by BLM through the wilderness characteristics inventory. Proposed actions in lands found by BLM to have wilderness characteristics are consistent with actions that are authorized under Wilderness Manual 6330 which may occur in Wilderness Study Areas. All proposed actions are designed to have only short-term, if any, impact to wilderness characteristics. Proposed treatments were also designed to: minimize the risk of invasion of cheat grass or noxious weeds, and utilize methodologies that minimize the short term visual and aesthetic impacts to the area. The proposed actions will not have a permanent impact to either the size of the inventoried wilderness characteristics unit or the individual wilderness characteristics.

The BLM concludes that the proposed ESR actions will not have substantial or long term impacts on the wilderness characteristics and would not affect either the existing finding that a unit contains wilderness characteristics, diminish the size of the unit, or affect the eventual management direction made at the conclusion of the agreed-to RMP Amendment process to address lands with wilderness characteristics, and thus would not benefit from additional analysis.

Short term impacts could include diminished recreational and wilderness experience for users in the setting and introducing new access with limited or restricted admittance. This would only occur during herbicide spraying operations at isolated locations.

Indirect effects would include potential impacts on wilderness characteristics from vehicles of recreationists and those used for rehabilitation efforts; however, monitoring of these routes will occur and if needed the placement of signs will be used to avoid long-term effects.

Although the settlement agreement (ONDA v. BLM, 2010) prohibits actions that would cause an area, or portion thereof, to no longer meet the minimum wilderness criteria, the minimum impact techniques used in restoration that would temporarily reduce wilderness characteristics would not have long term effects to the wilderness inventory units. For planning purposes, the

values the WIUs had at the time of the inventory determination (2009-2010) will be used in the RMP amendment, without consideration of any short-term impairment from ESR activities.

Cumulative Effects

As the Council on Environmental Quality (CEQ), in guidance issued on June 24, 2005, points out, the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the Proposed Action." Use of information on the effects on past actions may be useful in two ways according to the CEQ guidance. One is for consideration of the Proposed Action's cumulative effects, and secondly as a basis for identifying the Proposed Action's effects.

The CEQ stated in this guidance that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." Our information on the current environmental condition is more comprehensive and more accurate for establishing a useful starting point for a cumulative effects analysis, than attempting to establish such a starting point by adding up the described effects of individual past actions to some environmental baseline condition in the past that, unlike current conditions, can no longer be verified by direct examination.

The second area in which the CEQ guidance states that information on past actions may be useful is in "illuminating or predicting the direct and indirect effects of a Proposed Action." The usefulness of such information is limited by the fact that it is anecdotal only, and extrapolation of data from such singular experiences is not generally accepted as a reliable predictor of effects.

However, "experience with and information about past direct and indirect effects of individual past actions" have been found useful in "illuminating or predicting the direct and indirect effects" of the Proposed Action in the following instances: the basis for predicting the effects of the Proposed Action and its alternatives is based on the general accumulated experience of the resource professionals in the agency with similar actions.

The environmental consequences discussion described all expected effects, including direct, indirect, and cumulative, on resources from enacting the proposed alternatives. Direct and indirect effects plus past actions become part of the cumulative effects analysis; therefore, use of these words may not appear. In addition, the Introduction Section of this EA, specifically the Purpose of and Need for Action, identifies past actions creating the current situation.

RFFAs, also relevant to cumulative effects, include those Federal and non-Federal activities not yet undertaken, but sufficiently likely to occur, that a Responsible Official of ordinary prudence would take such activities into account in reaching a decision. These Federal and

non-Federal activities that must be taken into account in the analysis of cumulative impact include, but are not limited to, activities for which there are existing Decisions, funding, or proposals identified by the bureau. These RFFAs must fall within the geographic scope and timeframe of the analysis being prepared. Continued livestock grazing, weed treatments, road maintenance, recreation activities, and wild horse management are all RFFAs. The cumulative effects of these actions were thoroughly addressed throughout Chapter III, by resource, as applicable.

CHAPTER IV: CONSULTATION AND COORDINATION

A. Agencies, Tribes and Individuals Consulted

Bureau of Land Management
Burns Paiute Tribe
Fort McDermitt Paiute Shoshone Tribe
Vale District grazing permittees
Oregon Department of Fish and Wildlife
U.S. Fish and Wildlife Service
USDA Agricultural Research Service
Malheur County, Oregon

B. BLM Interdisciplinary Teams

Donald Rotell:	Natural Resource Specialist –Division of Fire and Aviation (*Fuels and Fire Management, Proposed Treatments)*
Cheryl Bradford:	Archaeologist *(American Indian Traditional Practices, Cultural Heritage)*
Kevin Eldredge:	Rangeland Management Specialist *(Grazing Management and Rangelands)*
Susan Fritts:	Jordan/Malheur Assistant Field Manager/Botanist (*ACEC/RNA, SSS Plants)*
Megan McGuire:	Wildlife Biologist (*Migratory Birds, SSS, Wildlife and Fisheries)*
Linus Meyer:	Natural Resource Specialist *(Soils, Water Quality, Wetlands/Riparian Zones*)
Kari Points:	Outdoor Recreation Planner (*Wilderness Study Areas, OHV, Travel Management)*
Lynne Silva:	Weed Specialist (*Noxious Weeds*)

C. Advisory

Thomas Patrick "Pat" Ryan:	Field Manager, Malheur Field Office
Marissa Russell:	GIS Coordinator
Shannon Wolery:	Litigation Specialist
Brent Grasty:	Planning and Environmental Coordinator

CHAPTER V: REFERENCES

Adams, B.A., J. Carlson, D. Milner, T. Hood, B. Cairns, and P. Herzog. 2004. Beneficial grazing management practices for Sage-Grouse (*Centrocercus urophasianus*) and ecology of silver sagebrush (*Artemisia cana*) in southeastern Alberta. Technical Report, Public Lands and Forests Division, Alberta Sustainable Resources Development. Pub. No. T/049. 60pp.

Allen, Cain. 2005. *Malheur Indian Reservation*. The Oregon History Project, Oregon Historical Society, Portland, Oregon.

Anderson, A., and K.C. McCuistion. 2008. Evaluating Strategies for Ranching in the 21st Century: Successfully Managing Rangeland for Wildlife and Livestock. Rangelands 30(2):8-14.

Austin, A.P., G.E. Harris, and W.P. Lucey. 1991. *Impact of an Organophosphate Herbicide (Glyphosate) on Periphyton Communities Developed in Experimental Streams*. Bulletin of Environmental Contamination and Toxicology 41:29-35.

Battaglin, W.A., E.T. Furlong, M.R. Burkhardt, and C.J. Peter. 2000. *Occurrence of Sulfonylurea, Sulfonamide, Imidazolinone, and Other Herbicides in Rivers, Reservoirs and Ground Water in the Midwestern United States, 1998*. Science of the Total Environment 248:123-133

Bureau of Land Management (USDI BLM). 2001. BLM. *Proposed Southeastern Oregon Resource Management Plan and final Environmental Impact Statement* Malheur and Jordan Resource Areas, Vale District BLM

Bureau of Land Management (USDI BLM). 2002. BLM. *Southeastern Oregon Resource Management Plan and Final Environmental Impact Statement.* Vale District BLM

Bureau of Land Management (USDI BLM). 2004. Emergency Fire Rehabilitation Program Management. Information Bulletin No. 2004-008. USDI , BLM, Washington Office, Washington, D.C.

Bureau of Land Management (USDI BLM). 2009. *Vale District Fire Management Plan*. Vale District BLM.

Bureau of Land Management (USDI BLM). 2007. *Programmatic Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States,* USDI , BLM, Washington Office, Washington, D.C.

Bureau of Land Management (USDI BLM). 2010. BLM. Final Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in Oregon. BLM. Portland, OR. July 2010.

Bureau of Land Management (USDI BLM). 2010. BLM. Vegetation Treatments Using Herbicides on BLM Lands in Oregon Record of Decision. BLM. Oregon State Office. October 2010.

Bureau of Land Management (USDI BLM). 2011. *Final Environmental Impact Statement Vegetation Treatments Using Herbicides on BLM Lands in Oregon*, USDI, BLM, Oregon State Office.

Cane, James H. 2011. Meeting Wild Bees' Needs on Western US Rangelands. Society for Range Management.

Chambers, J.C, D.A Pyke, J.D. Maestas, M. Pellant, C.S. Boyd, S.B. Campbell, S. Espinosa, D. Havlina, K.E. Mayer, A. Wuensschel. Using Resistance and Resilience Concepts to Reduce Impacts of Invasive Annual Grasses and Altered Fire Regimeson the Sagebrush Ecosystem and Greater Sage-grouse. USDA Forest Service. Gen. Tech. Rep. 326. Rocky Mountain Research Station, Fort Collins, Co.

D'Antonio, Carla M. 2000. Fire, plant invasions, and global changes. In: Mooney, Harold A.; Hobbs, Richard J., eds. Invasive species in a changing world. Washington, DC: Island Press: 65-93. [37679]

Davies, K.W., J.D. Bates, and R.F. Miller. 2007. Short-Term Effects of Burning Wyoming Big Sagebrush Steppe in Southeast Oregon. Rangeland Ecology and Management 60:515-522.

Davies, K. W., T. J. Svejcar, and J.D. Bates. 2009. Interaction of historical and nonhistorical disturbances maintains native plant communities. Ecological Applications 19(6): 1536-1545.

Davies, K.W., A.M. Nafus, and R.L. Sheley. 2010. Non-native competitive perennial grass impedes the spread of an invasive annual grass. Bio Invasions 12:3187–3194.

Davies, K.W. 2010. Revegetation of Medusahead-Invaded Sagebrush Steppe. Rangeland Ecology and Management 63(5): 564-571.

Davies, K.W., J.D. Bates, T.J. Svejcar, and C.S. Boyd. 2010. *Effects of Long-Term Livestock Grazing on Fuel Characteristics in Rangelands: An Example from the Sagebrush Steppe*. Rangeland Ecology and Management 63(6):662-669.

Davies, K.W., and R.L. Sheley. 2011. Promoting Native Vegetation and Diversity in Exotic Annual Grass Infestations. Restoration Ecology 19(2): 159-165.

Davison, J.C. and E.G. Smith. 2007. Imazapic provides 2-year control of weedy annual in a seeded Great Basin fuelbreak. Native Plants J. 8:91-95.

DiTomaso, J.M., G.B. Kyser, and M.J. Pitcairn. 2006. Yellow starthistle management guide. Cal-IPC Publication 2006-03. California Invasive Plant Council: Berkeley, CA. 78 pp. Available at http://www.cal-ipc.org

Dow AgroSciences. 1998. *Clopyralid: a North American Technical Profile.* Dow AgroSciences.

Economic Profile System (EPS). 2015. Tourism contribution; Malheur County. Data source: U.S. Department of Commerce. 2015. Census Bureau, County Business Patterns, Washington D.C. http://headwaterseconomics.org/tools/economic-profile-system#tourism-report-section

ENSR, International. 2005. Vegetation Treatments Programmatic EIS – Chlorsulfuron Ecological Risk Assessment Final Report. Prepared for the U.S. Department of the Interior Bureau of Land

Environmental Protection Agency. 1995. Reregistration Eligibility Decision Facts: Picloram. 11pp.

Gano, K. A.; Rickard, W. H. 1982. Small mammals of a bitterbrush-cheatgrass community. Northwest Science. 56(1): 1-7. [990]

Groves, Craig R.; Steenhof, Karen. 1988. Responses of small mammals and vegetation to wildfire in shadscale communities of southwestern Idaho. Northwest Science. 62(5): 205-210. [6584]

Hagen, C.A. 2011. *Greater sage-grouse conservation assessment and strategy for Oregon: a plan to maintain and enhance populations and habitat*. Oregon Department of Fish and Wildlife, Salem, USA.

Hakim, S.E.A. 1979 . Range condition on the Threemile game range in western Montana. M.S. Thesis, Univ. of Montana, Missoula, MT, Biology and Management of Noxious Rangeland Weeds, 351.

Howard, Janet L. 1999. Artemisia tridentata ssp. wyomingensis. In: Fire Effects Information System, [Online].

Idaho Fish and Game, OpEd, Issue 6 -17-2006. Noxious Weeds Are a Growing Problem. Window on the Clearwater. Orofino, ID

Knapp, Paul A. 1998. Spatio-temporal patterns of large grassland fires in the Intermountain West, U.S.A. Global Ecology and Biogeography Letters. 7(4): 259-273. [30109]

Knapp, S.T., 1996. Cheatgrass (Bromus tectorum L.) dominance in the Great Basin Desert: history, persistence, and influences to human activities. Global Environ. Change 6, 37-52.

Kochert, Michael N.; Steenhof, Karen; Carpenter, Leslie B.; Marzluff, John M. 1999. Effects of fire on golden eagle territory occupancy and reproductive success. Journal of Wildlife Management. 63(3): 773-780. [30363]

Koterba, M. T., W. S. L. Banks, and R. J. Shedlock. 1993. *Pesticides in Shallow Groundwater in the Delmarva Peninsula*. Journal of Environmental Quality. 22:500-518.

Lacey, C. 1989. Knapweed management - a decade of change, pp. 1-6. In Anon. *Proceedings of the Knapweed Symposium*. Montana State University, Bozeman, Montana, USA

Leger, E.A. 2008. The adaptive value of remnant native plants in invaded communities: an example from the Great Basin. Ecological Applications 18(5):1226-1235.

Lysne CR, Pellant M (2004) Establishment of aerially seeded big sagebrush following southern Idaho wildfires. Department of the Interior, Bureau of Land Management, Technical Bulletin 2004-01, Boise, ID.

McNaughton, S. J. 1993. Biodiversity and stability of grazing ecosystems. In E.-D. Shulze and H. A. Mooney, eds., *Biodiversity and Ecosystem Function.* Springer-Verlag, Berlin, pp. 361-383.

Metting, Blaine. 1981. *The Systematics and Ecology of Soil Algae.* The Botanical Review Vol 37, No 2. 118PP. Available at *http://www.springerlink.com/content/f0j48h5271624482/*

Miller, Derek. 2006. Controlling Annual Bromes. Rangelands: April 2006, Vol. 28, No. 2, pp. 22-25.

Monaco, T. A., D. A. Johnson, J. M. Norton, T. A. Jones, K. J. Connors, J. B. Norton, and M. B. Redinbaugh. 2003. Contrasting responses of Intermountain West grasses to soil nitrogen. Journal of Range Management 56:289–290.

Nielsen, Lawrence E. 1987. *In the Ruts of the Wagon Wheels: Pioneer Roads in Eastern Oregon.* Maverick Publications, Bend, Oregon.

Nielsen, Lawrence E., E. Lawrence, D. Newman and G. McCart. 1985. Pioneer Roads in Central Oregon. Maverick Publications, Bend Oregon.

ONDA v. BLM, 2010. United States Court of Appeals for the Ninth Circuit – Settlement Agreement – Dkt. 05-035931 entry 57-1, 57-2.

Oregon State Water Resources Board, 1969. Oregon's Long-Range Requirements for Water, General Soil Map Report with Irrigable Areas Malheur River Drainage Basin, Appendix I-10, Corvallis Oregon

Oregon Department of Agriculture. 2013. *2012-2013 Oregon Agriculture & Fisheries Statistics*. U.S. Department of Agriculture and Oregon Department of Agriculture (published December, 2013)

Oregon State University (OSO), 2012. *Oregon County and State Agricultural Estimates*, Agricultural and Resource Economics Department, May 2013.

Oregon-Washington State Director of the BLM and the Oregon State Historic Preservation Office. 2015. State Protocol for Cultural Resource Management.

Patton, B.D., X. Dong, P.E. Nyren, and A. Nyren. 2007. *Effects of Grazing Intensity, Precipitation, and Temperature on Forage Production*. Rangeland Ecology & Management 60(6):656-665.

Pellant, M., 1990. The cheatgrass–wildfire cycle-are there any solutions? In: McArthur, E.D., Romney, E.M., Smith, S.D., Tueller, P.T. (Comps.), Proceedings-Symposium on Cheatgrass Invasion, Shrub Die-off, and Other Aspects of Shrub Biology and Management, 5–7 April 1989, Las Vegas, NV. Gen. Tech. Rep. INT-276. USDA Forest Service, Intermountain Research Station, Ogden, UT, pp. 11–18.

Pellant, M. 1996. Cheatgrass: The Invader that won the West. Interior Columbia Basin Ecosystem Management Project. Bureau of Land Management, Idaho State Office, Boise, Idaho.

Pellant M, Abbey B, Karl S (2004) Restoring the Great Basin desert, U.S.A.: integrating science, management and people. Environmental Monitoring and Assessment 99:169–179.

Peters, Erin F.; Bunting, Stephen C. 1994. Fire conditions pre- and postoccurrence of annual grasses on the Snake River Plain. In: Monsen, Stephen B.; Kitchen, Stanley G., comps. Proceedings--ecology and management of annual rangelands; 1992 May 18-22; Boise, ID. Gen. Tech. Rep. INT-GTR-313. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 31-36. [24249]

Pyke, David A. 2011. Restoring and rehabilitating sagebrush habitats. Pp. 531-584 in S.T. Knick and J.W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Pyke, D.A., S. Shaff, A. Lindfren, P. Doesher, E. W. Schupp, and J. C. Chambers. 2014. Ecological responses of arid Wyoming big sagebrush communities to fuel treatments in the Intermountain West. Rangeland Ecology and Management, 67 (5): pp.455-467.

Sarmah, A.K., and J. Sabadie. 2002. *Hydrolysis of Sulfonylurea Herbicides in Soils and Aqueous Solutions: A Review*. Journal Of Agricultural and Food Chemistry 50:6253-6265.

Sbatella,G and Twelker, S. 2013. Ventenata (Ventenata dubia) Control in Rangelands for Central Oregon with Fall Applications. Central Oregon Agricultural Research Station. Research paper.

Shinn, Sandra L. and Donald C. Thill. 2004. Tolerance of Several Perennial Grasses to Imazapic. Weed Technology, Jan 2004 Volume 10:pp. 60-65.

Syracuse Environmental Research Associates, Inc. (SERA). 2004. Chlorsulfuron – Human Health and Ecological Risk Assessment Final Report. SERA TR 04-43-18-01c. Prepared for the U.S. Department of Agriculture Forest Service, Arlington, Virginia. Fayetteville, New York.

Tu et al, Imazapic, Weed Control Methods Handbook, The Nature Conservancy, 2004

Tu, M., C. Hurd, and J. M. Randall. 2001. Weed Control Methods Handbook: Tools & Techniques for Natural Areas. The Nature Conservancy. Available at http://www.invasive.org/gist/handbook.html. June 2001.

USDA, USDI. USDA Forest Service and USDI Bureau of Land Management. 2004. Management of Port-Orford Cedar in Southern Oregon. Final Environmental Impact Statement.

USDA Natural Resource Conservation Service. 2004. Soil Quality – Soil Biology Technical Note No. 4. Soil Biology and Land Management, January 2004. Available at: http://soils.usda.gov/sqi

USDA, Forest Service. *Fire Effects Information System* (USFS Search Engine and Software Application). June, 2005. Rocky Mountain Research Station, Fire Sciences Laboratory (Publisher). Available: http://www.fs.fed.us/database/feis/

USDI. Bureau of Land Management. Northwest Area Noxious Weed Control Program EIS. Final Environmental Impact Statement. 1985.

USDI. Bureau of Land Management. Northwest Area Noxious Weed Control Program Record of Decision. 1986

USDI. Bureau of Land Management. Supplement to the Northwest Area Noxious Weed Control Program EIS. Final Environmental Impact Statement. March, 1987.

USDI. Bureau of Land Management. Supplement to the Northwest Area Noxious Weed Control Program Record of Decision. May, 1987

USDI. Bureau of Land Management, Vale District. Vale District 5 year Integrated Weed Control Plan. Environmental Assessment, OR-010-89-19. 1989.

USDI. Bureau of Land Management. Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement. 2007.

USDI. Bureau of Land Management. Vegetation Treatments Using Herbicides on BLM Lands in Oregon. Final Environmental Impact Statement. 2010. Available at http: //www.blm.gov/or/plans/vegtreatseis/.

USFWS. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp.

USFWS. 2013. Greater Sage-Grouse Conservation Objectives: Final Report. 115 pp.

Verts, B.J. and L.N. Carraway. 1998. Land Mammals of Oregon. University of California Press, Berkeley and Los Angeles, California.

Von Reis, Jennifer Clark. 2015. *The effects of select herbicides on the biological soil crust in shrub steppe areas of the Columbia Basin, Washington.* A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, Washington State University, School of the Environment.

Washington State University. *Ventanata.* WSU Extension Service Publication No. EB2038E. 2008.

Wambolt, C. L.; Hoffman, G. R. 2001. Mountain big sagebrush age distribution and relationships on the northern Yellowstone winter range. In: McArthur, E. D.; Fairbanks, D. J., comps. Shrubland ecosystem genetics and biodiversity: proceedings; 2000 June 13–15; Provo, UT. RMRS-P-21. Ogden, UT: U.S. Department of the Interior, Forest Service, Rocky Mountain Research Station: 330–335.

Weiss, N.T. and B.J. Verts. 1984. Habitat and distribution of pygmy rabbits (*Sylvilagus idahoensis*) in Oregon. Great Basin Naturalist. 44(4):563-571.

West, N. E. 2000. Synecology and disturbance regimes of sagebrush steppe ecosystems. In: Entwistle, P. G.; DeBolt, A. M.; Kaltenecker, J. H.; Steenhof, K., comps. Sagebrush steppe ecosystems symposium: proceedings; 1999 June 23–25; Boise, ID. BLM/ID/PT- 001001+1150. Boise, ID: U.S. Department of the Interior, Bureau of Land Management: 15–26.

Whisenant, S.G. 1990 Changing fire frequencies on Idaho's Snake River Plains: Ecological and management implications. Pages 4-10 *in* E.D. McArthur, E.M. Romney, S.D. Smith, and P.T. Tueller, compliers. Proceedings: symposium on cheatgrass invasion, shrub die-off and other aspects of shrub biology and management. USDA General Technical Report INT-276, Ogden, Utah, USA.

Wood and Anthony 1997 Wood, J.A., and D.H.J. Anthony. 1997. *Herbicide Contamination of Prairie Springs at Ultratrace Levels of Detection*. Journal of Environmental Quality 26:1308-1318.

Young, James A.; Evans, Raymond A. 1978. Population dynamics after wildfires in sagebrush grasslands. Journal of Range Management. 31(4): 283-289. [2657]

Youtie, B., J. Ponzetti, and D. Salzer. 1999. *Fire and herbicides for exotic annual grass control: effects on native plants and microbiotic soil organisms.* In: Eldridge, D., and D. Freudenberger, eds. Proceedings of the VI International Rangeland Congress, Aitkenvale, Queensland, Australia. 590-591.

Zouhar, Kristin; Smith, Jane Kapler; Sutherland, Steve; Brooks, Matthew L. 2008. Wildland Fire in Ecosystems: Fire and Nonnative Invasive Plants. Gen. Tech. Rep. RMRS-GTR-42-vol. 6. Ogden, UT: U.S. Department ofAgriculture, Forest Service, Rocky Mountain Research Station.

APPENDIX A - PROJECT DESIGN FEATURES, STANDARD OPERATING PROCEDURES, MITIGATION MEASURES, CONSERVATION MEASURES, PREVENTION MEASURES, AND BEST MANAGEMENT PRACTICES

Information included in this Appendix is a compilation of information originally presented in the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement* (USDI 2007a), *Record of Decision* (USDI 2007c), and *Biological Assessment* (USDI 2007f), as well as the *Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report* (USDI 2007b), and the Oregon FEIS (USDI 2010a) and Record of Decision (USDI 2010b).

Standard Operating Procedures and Mitigation Measures

In the following section, Standard Operating Procedures applicable to non-herbicide treatments are listed first under each resource, followed by the Standard Operating Procedures, Mitigation Measures, and Oregon FEIS Mitigation Measures applicable to herbicide applications.

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.[6] The list is not all encompassing, but is designed to give an overview of practices that would be considered when designing and implementing a vegetation treatment project on public lands (USDI 2007b:2-29). Effects described in this EA are predicated on application of the Standard Operating Procedures or equivalent, unless an on-site determination is made that their application is unnecessary to achieve their intended purpose or protection. For example, the Standard Operating Procedure to "complete vegetation treatments seasonally before pollinator foraging plants bloom" would not be applied to treatments not likely to have a significant effect on pollinators.

PEIS Mitigation Measures (marked as MMs in the list below) were identified for all potential adverse effects identified for herbicide applications in the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (17-States PEIS; BLM 2007a), and adopted by its Record of Decision. In other words, NO potentially significant adverse effect identified in the 17 States analysis remained at the programmatic scale after the PEIS Mitigation Measures were adopted. Like the Standard Operating Procedures, application of the mitigation measures is assumed in the analysis in this EA, and on-site determinations can decide if their application is unnecessary to achieve the intended purpose or protection.

[6] Manual-directed standard operating procedures and other standing direction may be referred to as best management practices in resource management and other plans, particularly when they apply to water.

Oregon FEIS Mitigation Measures (marked as Oregon FEIS MMs in the list below) were identified and adopted for adverse effects identified in the *Final Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement* (Oregon Final EIS; BLM 2010a). Application of these measures is also assumed in the analysis in this EA unless on-site determinations are made that they are not needed, or there are alternative ways, to meet the intended purpose or protection. Again, no potentially significant adverse effect was identified at the programmatic scale in the Oregon FEIS with the Standard Operating Procedures and Mitigation Measures assumed.

BLM manuals and handbooks are available online at http://www.blm.gov/wo/st/en/info/blm-library/publications/blm_publications/manuals.html

Guidance Documents

Chemical

BLM Handbook H-9011-1 (Chemical Pest Control), and manuals 1112 (Safety), 9011 (Chemical Pest Control), 9015 (Integrated Weed Management), and 9220 (Integrated Pest Management).

General

Chemical

- Prepare an operational and spill contingency plan in advance of treatment.
- Conduct a pretreatment survey before applying herbicides.
- 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.
- Have licensed or certified applicators or State-licensed “trainees” apply herbicides, or they can be applied by BLM employees under the direct supervision of a BLM-certified applicator.
- Use only USEPA-approved herbicides and follow product label directions and “advisory” statements.
- 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.
- Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas.
- 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.
- Post treated areas and specify reentry or rest times, if appropriate.
- Notify adjacent landowners prior to treatment, if appropriate.

- Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are available for review at http:// www.cdms.net/.
- 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.
- Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence).
- Make helicopter applications at a target airspeed of 40 to 50 miles per hour (mph), and at about 30 to 45 feet above ground.
- Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent.
- Use drift control agents and low volatile formulations.
- 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.
- Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species.
- Turn off application equipment at the completion of spray runs and during turns to start another spray run.
- Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- Clean OHVs to remove plant material.

The BLM has suspended the use of the adjuvant R-11.

Land Use

Chemical

- Consider surrounding land uses before aerial spraying.
- Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents and landowners.
- Post treated areas and specify reentry times, if appropriate

Air Quality

See Manual 7000 (Soil, Water, and Air Management).

Chemical

- 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, do not treat when winds exceed 10 mph (>6 mph for aerial applications) or rainfall is imminent.
- 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 Resources

See Manual 7000 (Soil, Water, and Air Management).

General

- Assess the susceptibility of the treatment site to soil damage and erosion prior to treatment.

Chemical

- Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected.
- Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility.
- Do not apply granular herbicides on slopes of more than 15% where there is the possibility of runoff carrying the granules into non-target areas.
- To avoid the loss of finer-sized soil particles and avoid having herbicide-treated soils blown or washed off-site, avoid exposing large areas of wind-erosion group 1 or 2 soils when a combination of dry soil and seasonal winds are expected. Mitigation measures could include the use of selective herbicides to retain some vegetation on site; reseeding so cover is present before the windy season affects dry soils; staggering treatment of strips until stubble regrows enough to provide an acceptable filter strip; rescheduling treatments away from the windy season; or, other measures to prevent wind erosion on these soil groups. (Oregon FEIS MM)

Water Resources

See Manual 7000 (Soil, Water, and Air Management).

Chemical

- Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs.
- Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments.
- Use local historical weather data to choose the month of treatment.
- Considering the phenology of target aquatic species, schedule treatments based on the condition of the water body and existing water quality conditions.
- Plan to treat between weather fronts (calms) and at appropriate time of day to avoid high winds that increase water movements, and to avoid potential stormwater runoff and water turbidity.
- Review hydrogeologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination.
- 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.

- Do not broadcast pellets where there is danger of contaminating water supplies.
- Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment.
- Establish appropriate (herbicide-specific) buffer zones for species/populations (Tables A-1 and A-2). (MM)
- Areas with potential for groundwater for domestic or municipal use shall be evaluated through the appropriate, validated model(s) to estimate vulnerability to potential groundwater contamination, and appropriate mitigation measures shall be developed if such an area requires the application of herbicides and cannot otherwise be treated with non-herbicide methods. (MM)
- Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
- Maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide and site-specific conditions to minimize impacts to water bodies.
- To protect domestic water sources, no herbicide treatments should occur within 100 feet of a well or 200 feet of a spring or known diversion used as a domestic water source unless a written waiver is granted by the user or owner. (Oregon FEIS MM)
- Site-specific analyses for roadside treatments should specifically consider that drainage ditches and structures lead to streams and that normal buffer distances, herbicide selection, and treatment method selection may need to be changed accordingly, particularly where those ditches are connected to streams with Federally Listed or other Special Status species. (Oregon FEIS MM)
- Buffer intermittent stream channels when there is a prediction of rain (including thunderstorms) within 48 hours. (Oregon FEIS MM)
- Proposals to boom or aerially spray herbicides within 200 feet of streams that are within 1,000 feet upstream from a public water supply intake, or spot apply herbicides within 100 feet of streams that are within 500 feet upstream from a public water supply intake, will include coordination with the Oregon Department of Environmental Quality and the municipality to whom the intake belongs. (Oregon FEIS MM)

Wetlands and Riparian Areas

Chemical

- Use a selective herbicide and a wick or backpack sprayer.
- Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
- See mitigation for Water Resources and Vegetation. (MM)

Vegetation

See Handbook H-4410-1 (National Range Handbook), and manuals 5000 (Forest Management) and 9015 (Integrated Weed Management).

Chemical

- Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- Use native or sterile plants for revegetation and restoration projects to compete with invasive plants until desired vegetation establishes.
- Use weed-free feed for horses and pack animals. Use weed-free straw and mulch for revegetation and other activities.
- Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit, to maintain desirable vegetation on the treatment site.
- Minimize the use of terrestrial herbicides (especially sulfometuron methyl) in watersheds with downgradient ponds and streams if potential impacts to aquatic plants are identified. (MM)
- Establish appropriate (herbicide-specific) buffer zones (Tables A-1 and A-2) around downstream water bodies, habitats, and species/populations of interest. Consult the ecological risk assessments (ERAs) prepared for the PEIS for more specific information on appropriate buffer distances under different soil, moisture, vegetation, and application scenarios. (MM)
- Limit the aerial application of chlorsulfuron and metsulfuron methyl to areas with difficult land access, where no other means of application are possible. (MM)
- When necessary to protect Special Status plant species, implement all conservation measures for plants presented in the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment (see Appendix 5). (MM)

Pollinators

Chemical

- Complete vegetation treatments seasonally before pollinator foraging plants bloom.
- Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily.
- Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment.
- Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources.
- Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources.
- Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula.
- Make special note of pollinators that have single host plant species, and minimize herbicide spraying on those plants and in their habitats.

Fish and Other Aquatic Resources

See manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans)

Chemical

- 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 dicamba, glyphosate, hexazinone, or triclopyr, where feasible. (MM)
- Minimize the size of application areas, where practical, when applying 2,4-D and Overdrive® to limit impacts to wildlife, particularly through contamination of food items. (MM)
- Where practical, limit glyphosate and hexazinone to spot applications in grazing land and wildlife habitat areas to avoid contamination of wildlife food items. (MM)
- Do not use the adjuvant R-11 (MM)
- Either avoid using glyphosate formulations containing POEA, or seek to use formulations with the least amount of POEA, to reduce risks to amphibians. (MM)
- 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 Appendix 5) (MM)
- Impacts to wildlife from herbicide applications can be reduced by treating habitat during times when the animals are not present or are not breeding, migrating or confined to localized areas (such as crucial winter range). (Oregon FEIS MM)
- When treating native plants in areas where herbivores are likely to congregate, choose herbicides with lower risks due to ingestion. This mitigation measure is applicable if large areas of the herbivores' feeding range would be treated, either because the treatment areas are large or the feeding area for an individual animal is small. (Oregon FEIS MM)
- Where there is a potential for herbivore consumption of treated vegetation, apply dicamba, imazapyr, and metsulfuron methyl at the typical, rather than maximum, application rate to minimize risks. (Oregon FEIS MM)
- Where possible, design native vegetation treatment areas to mimic natural disturbance mosaics. Patchiness is usually beneficial to most wildlife, and patchiness is usually tolerated by species that prefer contiguous habitat. (Oregon FEIS MM)
- Use of adjuvants with limited toxicity and low volumes is recommended for applications near aquatic habitats. (Oregon FEIS MM)

Special Status Species

See Manual 6840 (Special Status Species) and Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Biological Assessment.

Chemical

- Provide clearances for Special Status species before treating an area as required by Special Status Species Program policy. Consider effects to Special Status species when designing herbicide treatment programs.
- Use a selective herbicide and a wick or backpack sprayer to minimize risks to Special Status plants.
- Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for Special Status species in area to be treated.

Livestock

See Handbook H-4120-1 (Grazing Management).

Chemical

- Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible.
- As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable.
- Use herbicides of low toxicity to livestock, where feasible.
- Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources.
- Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
- Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary.
- Provide alternative forage sites for livestock, if possible.
- Minimize potential risks to livestock by applying glyphosate, hexazinone, or triclopyr at the typical application rate where feasible. (MM)
- Do not apply 2,4-D, dicamba, Overdrive®, picloram, or triclopyr across large application areas, where feasible, to limit impacts to livestock, particularly through contamination of food items. (MM)
- Where feasible, limit glyphosate and hexazinone to spot applications in rangeland. (MM)
- Where there is a potential for livestock consumption of treated vegetation, apply dicamba, imazapyr, and metsulfuron methyl at the typical, rather than maximum, application rate to minimize risks to livestock. (Oregon FEIS MM)

Paleontological and Cultural 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 (1997) and the State Protocol between the Oregon-Washington State Director of the Bureau of Land Management (BLM) and The Oregon State Historic Preservation Officer (SHPO) regarding the manner in which the Bureau of Land Management will meet its responsibilities under the National Historic Preservation Act and the National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, and The National Conference of State Historic Preservation Officers. (2015).

Chemical

- 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 1 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 the PEIS in areas that may be visited by Native peoples after treatments.
- Do not exceed the typical application rate when applying 2,4-D, fluridone, hexazinone, and triclopyr in known traditional use areas. (MM)

Visual Resources

See handbooks H-8410-1 (Visual Resource Inventory) and H-8431-1 (Visual Resource Contrast Rating), and Manual 8400 (Visual Resource Management).

Chemical

- Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation.
- Consider the surrounding land use before assigning aerial spraying as an application method.
- 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.

- If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II).
- Lessen visual impacts by: 1) designing projects to blend in with topographic forms; 2) leaving some low growing trees or planting some low-growing tree seedlings adjacent to the treatment area to screen short-term effects; and 3) 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 (VRM) objectives.

Wilderness and Other Special Areas

See handbooks H-8550-1 (Management of Wilderness Study Areas (WSAs)), and H-8560-1 (Management of Designated Wilderness Study Areas), and Manual 8351 (Wild and Scenic Rivers).

General

- Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a wilderness area, and to bring only weed-free hay and straw onto BLM lands.
- Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation.
- Revegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration.
- Provide educational materials at trailheads and other wilderness entry points to educate the public on the need to prevent the spread of weeds.

Chemical

- Use the “minimum tool” to treat noxious weeds and other invasive plants, relying primarily on the use of ground based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock.
- Use herbicides only when they are the minimum treatment method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness.
- Give preference to herbicides that have the least impact on non-target species and the wilderness environment.
- Implement herbicide treatments during periods of low human use, where feasible.
- Address wilderness and special areas in management plans.
- Control of weed infestations shall be carried out in a manner compatible with the intent of Wild and Scenic River management objectives.
- Mitigation measures that may apply to wilderness and other special area resources are associated with human and ecological health and recreation (see mitigation measures for Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, Recreation, and Human Health and Safety). (MM)

Recreation

See Handbook H-1601-1 (Land Use Planning Handbook).

Chemical

- Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species.
- Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas.
- Adhere to entry restrictions identified on the herbicide product label for public and worker access.
- Post signs noting exclusion areas and the duration of exclusion, if necessary.
- 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). (MM)

Social and Economic Values

Chemical

- Consider surrounding land use before selecting aerial spraying as a treatment method, and avoid aerial spraying near agricultural or densely-populated areas.
- Post treated areas and specify reentry or rest times, if appropriate.
- Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions.
- Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
- Control public access until potential treatment hazards no longer exist, per herbicide product label instructions.
- Observe restricted entry intervals specified by the herbicide product label.
- Notify local emergency personnel of proposed treatments.
- Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating non-target food and water sources.
- Consult with Native American tribes to locate any areas of vegetation that are of significance to the tribes and Native groups and that might be affected by herbicide 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.
- To minimize fears based on lack of information, 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.
- For herbicides with label-specified re-entry intervals, post information at access points to recreation sites or other designated public use or product collection areas notifying the public of planned herbicide treatments in languages known to be used by persons likely to be using the area to be treated. Posting should include the date(s) of treatment, the herbicide to be used, the date or time the posting expires,

and a name and phone number of who to call for more information. (Oregon FEIS MM)

- Consider the potential for treatments to affect communities from herbicide-contaminated resources originating from the BLM, such as subsistence resources or water used downstream for human or agricultural uses. (Oregon FEIS MM)
- Coordinate with and/or notify neighboring landowners who may want to treat, or are already treating, adjacent lands. (Oregon FEIS MM)
- To the extent permitted by normal contracting authority, ensure materials safety data sheets and other informational or precautionary materials are available in languages spoken by the work crews implementing treatments. This includes but is not limited to material such as Occupational Safety and Health Administration standards along with agency, industry and manufacturers' recommendations and Human Health and Safety Standard Operating Procedures and mitigation measures or equivalent. (Oregon FEIS MM)

Rights-of-way

Chemical

- Coordinate vegetation treatment activities where joint or multiple use of a ROW exists.
- Notify other public land users within or adjacent to the ROW proposed for treatment.
- Use only herbicides that are approved for use in ROW areas.

Human Health and Safety

Chemical

- Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted.
- Use protective equipment as directed by the herbicide product label.
- Post treated areas with appropriate signs at common public access areas.
- Observe restricted entry intervals specified by the herbicide product label.
- Provide public notification in newspapers or other media where the potential exists for public exposure.
- Store herbicides in secure, herbicide-approved storage.
- Have a copy of MSDSs at work site.
- Notify local emergency personnel of proposed treatments.
- Contain and clean up spills and request help as needed.
- Secure containers during transport.
- Follow label directions for use and storage.
- Dispose of unwanted herbicides promptly and correctly.
- Use the typical application rate, where feasible, when applying 2,4-D, fluridone, hexazinone, and triclopyr to reduce risk to workers and the public. (MM)
- Limit application of chlorsulfuron via ground broadcast applications at the maximum application rate. (MM)

- Consideration should be given to herbicides other than 2,4-D; use of 2,4-D should be limited to situations where other herbicides are ineffective or in situations in which the risks posed by 2,4-D can be mitigated (Oregon FEIS MM).

Table A-1: Buffer Distances to Minimize Risk to Vegetation from Off-Site Drift of BLM-Evaluated Herbicides

Application Scenario	Chlorsulfuron		Imazapic		
Buffer Distance (feet) from Non-target Aquatic Plants					
Typical Application Rate					
Aerial	0		0		
Low Boom[2]	0		0		
High Boom[2]	0		0		
Maximum Application Rate					
Aerial	300		300		
Low Boom[2]	0		0		
High Boom[2]	0		0		
Buffer Distance (feet) from Non-target Terrestrial Plants					
Typical Application Rate					
Aerial	1,350		0		
Low Boom[2]	900		0		
High Boom[2]	900		0		
Maximum Application Rate					
Aerial	1,350		900		
Low Boom[2]	1,000		0		
High Boom[2]	1,000		0		
Buffer Distance (feet) from Threatened, Endangered, and Sensitive Plants					
Typical Application Rate					
Aerial	1,400		0		
Low Boom[2]	1,000		0		
High Boom[2]	1,000		0		
Maximum Application Rate					
Aerial	1,400		900		
Low Boom[2]	1,050		0		
High Boom[2]	1,000		0		

2 High boom is 50 inches above ground and low boom is 20 inches above ground.
NE =Not evaluated and NA =not applicable.
Buffer distances are the smallest modeled distance at which no risk was predicted. In some cases, buffer distances were extrapolated if the largest distance modeled still resulted in risk, or interpolated if greater precision was required.

Table A-2: Buffer Distances to Minimize Risk to Vegetation from Off-Site Drift of Forest Service Evaluated Herbicides

Application Scenario	2,4-D	Dicamba	Clopyralid	Glyphosate				Picloram	
Buffer Distance (feet) from Susceptible Plants[1]									
Typical Application Rate									
Aerial	NE	>900	900	300				>900	
Low Boom	NE	300	900	50				>900	
Maximum Application Rate									
Aerial	NE	>900	1,000	300	E			>900	
Low Boom	NE	900	1 000	300				>900	
Buffer Distance (feet) from Tolerant Terrestrial Plants									
Typical Application Rate									
Aerial	NE	0	0	25				25	
Low Boom	NE	0	0	25				25	

Application Scenario	2,4-D	Dicamba	Clopyralid	Glyphosate				Picloram	
Maximum Application Rate									
Aerial	NE	0	25	50				50	
Low Boom	NE	0	25	25				25	

NE = Not evaluated.
Buffer distances are the smallest modeled distance at which no risk was predicted. In some cases, buffer distances were extrapolated if the largest distance modeled still resulted in risk, or interpolated if greater precision was required.
[1] Mitigation measures for Bureau Sensitive or federally listed species use these buffer distances

Table A-3: Buffer Distances to Minimize Risk to Non-Special Status Fish and Aquatic Invertebrates from Off-Site Drift of BLM-Evaluated Herbicides from Broadcast and Aerial Treatments

Application Scenario	Chlorsulfuron		Imazapic		
Minimum Buffer Distance (feet) from Fish and Aquatic Invertebrates					
Typical Application Rate					
Aerial	0		0		
Low boom	0		0		
High boom	0		0		
Maximum Application Rate					
Aerial	0		0		
Low boom	0		0		
High boom	0		0		

NA Not applicable.
Boom height= The Tier I ground application model allows selection of a low (20 inches) or a high (50 inches) boom height.

Table A-4: Buffer Distances to Minimize Risk to Special Status Fish and Aquatic Invertebrates from Off-Site Drift of BLM-Evaluated Herbicides from Broadcast and Aerial Treatments

Application Scenario	Chlorsulfuron	e	Imazapic		
Minimum Buffer Distance (feet) from Fish and Aquatic Invertebrates					
Typical Application Rate					
Aerial	0		0		
Low boom	0		0		
High boom	0		0		
Maximum Application Rate					
Aerial	0		0		
Maximum Application Rate					
Low boom	0		0		
High boom	0		0		

NA= Not applicable.
Boom height= The Tier I ground application model allows selection of a low (20 inches) or a high (50 inches) boom height.

Best Management Practices for Noxious Weed Management

- Best Management Practices (BMPs) are those land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. Interdisciplinary site-specific analysis is necessary to determine which management practices would be necessary to meet specific goals. BMP's

described are designed to assist in achieving the objectives for maintaining or improving water quality, soil productivity, and the protection of watershed resources. The ones specific to noxious weed management are provided below. They are included in the *District's Resource Management Plan* under a variety of resource headings. The ones specific to noxious weed management are provided below. All contractors and land-use operators moving surface-disturbing equipment in or out of weed-infested areas should clean their equipment before and after use on public land.

- Control weeds annually in areas frequently disturbed such as gravel pits, recreation sites, road sides, livestock concentration areas.
- It is recommended that all vehicles, including off-road and all-terrain, traveling in or out of weed-infested areas should clean their equipment before and after use on public land.

Invasive Plant Prevention Measures

Invasive Plant Prevention Measures are designed to prevent the spread of invasive plants by minimizing the amount of existing non-target vegetation that is disturbed or destroyed during project or vegetation treatment actions (USDI 2007a:2-20). They are designed to work in conjunction with BLM's policy requiring that planning for ground-disturbing projects in the Resource Area, or those that have the potential to alter plant communities, include an assessment of the risk of introducing noxious weeds, and if there is a moderate or high risk of spread, actions to reduce the risk must be implemented and monitoring of the site must be conducted to prevent establishment of new infestations.

Project Planning

- Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds.
- Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning.
- Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes.
- Remove sources of weed seed and propagules to prevent the spread of existing weeds and new weed infestations.
- Pre-treat high-risk sites for weed establishment and spread before implementing projects.
- Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks. Coordinate project activities with nearby herbicide applications to maximize the cost-effectiveness of weed treatments.

Project Development

- Minimize soil disturbance to the extent practical, consistent with project objectives.
- Avoid creating soil conditions that promote weed germination and establishment.

- To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives.
- Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagules is least likely.
- Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material.
- Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material.
- Survey the area where material from treated weed-infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled.
- Prevent weed establishment by not driving through weed-infested areas.
- Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent spread within the project area.
- Avoid acquiring water for dust abatement where access to the water is through weed-infested sites.
- Identify sites where equipment can be cleaned. Clean equipment before entering public lands.
- Clean all equipment before leaving the project site if operating in areas infested with weeds.
- Inspect and treat weeds that establish at equipment cleaning sites.
- Ensure that rental equipment is free of weed seed.

Conservation Measures from the PEIS Biological Assessment

Mitigation Measures (above) include "when necessary to protect Special Status [plant/fish/wildlife species], implement all conservation measures for [plant/fish/wildlife species] presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment*" (USDI 2007f). Those Conservation Measures are presented here for use with Special Status species as needed.

Plant Conservation Measures

As dictated in BLM Manual 6840 (*Special Status Species Management*), local BLM offices are required to develop and implement management plans and programs that will conserve listed species and their habitats. In addition, NEPA documentation related to treatment activities (i.e., projects) will be prepared that identify any TEP[7] plant species or their critical habitat that are present in the proposed treatment areas, and that list the measures that will be taken to protect them.

[7] Federally listed as threatened or endangered, or proposed for such listing.

Many local BLM offices already have management plans in place that ensure the protection of these plant species during activities on public land. However, a discussion of these existing plans is outside the scope of this programmatic BA. The following general guidance applies to all management plans developed at the local level.

Required steps include the following:

- A survey of all proposed action areas within potential habitat by a botanically qualified biologist, botanist, or ecologist to determine the presence/absence of the species.
- Establishment of site-specific no activity buffers by a qualified botanist, biologist, or ecologist in areas of occupied habitat within the proposed project area. To protect occupied habitat, treatment activities would not occur within these buffers.
- Collection of baseline information on the existing condition of TEP plant species and their habitats in the proposed project area.
- Establishment of pre-treatment monitoring programs to track the size and vigor of TEP populations and the state of their habitats. These monitoring programs would help in anticipating the future effects of vegetation treatments on TEP plant species.
- Assessment of the need for site revegetation post treatment to minimize the opportunity for noxious weed invasion and establishment.

At a minimum, the following must be included in all management plans:

- Off-highway use of motorized vehicles associated with treatments should be avoided in suitable or occupied habitat.
- Post-treatment monitoring should be conducted to determine the effectiveness of the project.

In addition, the following guidance must be considered in all management plans in which herbicide treatments are proposed to minimize or avoid risks to TEP species. The exact conservation measures to be included in management plans would depend on the herbicide that would be used, the desired mode of application, and the conditions of the site. Given the potential for off-site drift and surface runoff, populations of TEP species on lands not administered by the BLM would need to be considered if they are located near proposed herbicide treatment sites.

- Herbicide treatments should not be conducted in areas where TEP plant species may be subject to direct spray by herbicides during treatments.
- Applicators should review, understand, and conform to the “Environmental Hazards” section on herbicide labels (this section warns of known pesticide risks and provides practical ways to avoid harm to organisms or the environment).
- To avoid negative effects to TEP plant species from off-site drift, surface runoff, and/or wind erosion, suitable buffer zones should be established between treatment sites and populations (confirmed or suspected) of TEP plant species, and site-specific precautions should be taken (refer to the guidance provided below).
- Follow all instructions and Standard Operating Procedures to avoid spill and direct spray scenarios into aquatic habitats that support TEP plant species.
- Follow all BLM operating procedures for avoiding herbicide treatments during climatic conditions that would increase the likelihood of spray drift or surface runoff.

The following conservation measures refer to sites where broadcast spraying of herbicides, either by ground or aerial methods, is desired. Manual spot treatment of undesirable vegetation can occur within the listed buffer zones if it is determined by local biologists that this method of herbicide application would not pose risks to TEP plant species in the vicinity. Additional precautions during spot treatments of vegetation within habitats where TEP plant species occur should be considered while planning local treatment programs, and should be included as conservation measures in local-level NEPA documentation.

The buffer distances provided below are conservative estimates, based on the information provided by ERAs, and are designed to provide protection to TEP plants. Some ERAs used regression analysis to predict the smallest buffer distance to ensure no risks to TEP plants. In most cases, where regression analyses were not performed, suggested buffers extend out to the first modeled distance from the application site for which no risks were predicted. In some instances the jump between modeled distances was quite large (e.g., 100 feet to 900 feet). Regression analyses could be completed at the local level using the interactive spreadsheets developed for the ERAs, using information in ERAs and for local site conditions (e.g., soil type, annual precipitation, vegetation type, and treatment method), to calculate more precise, and possibly smaller buffers for some herbicides.

2,4-D

- Because the risks associated with this herbicide were not assessed, do not spray within ½ mile of terrestrial plant species or aquatic habitats where TEP aquatic plant species occur.
- Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur.
- Assess local site conditions when evaluating the risks from surface water runoff to TEP plants located within ½ mile downgradient from the treatment area.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Chlorsulfuron

- Do not apply by ground methods within 1,200 feet of terrestrial TEP species.
- Do not apply by aerial methods within 1,500 feet of terrestrial TEP species.
- Do not apply by ground methods within 25 feet of aquatic habitats where TEP plant species occur.
- Do not apply by aerial methods at the maximum application rate within 300 feet of aquatic habitats where TEP plant species occur.
- Do not apply by aerial methods at the typical application rate within 100 feet of aquatic habitats where TEP plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Clopyralid

- Since the risks associated with using a high boom are unknown, use only a low boom during ground applications of this herbicide within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by ground methods at the typical application rate within 900 feet of terrestrial TEP species.

- Do not apply by ground methods at the typical application rate within ½ mile of terrestrial TEP species.
- Do not apply by aerial methods within ½ mile of terrestrial TEP species.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Dicamba
- If using a low boom at the typical application rate, do not apply within 1,050 feet of terrestrial TEP plant species.
- If using a low boom at the maximum application rate, do not apply within 1,050 feet of terrestrial TEP plant species.
- If using a high boom, do not apply within 1,050 feet of terrestrial TEP plant species.
- Do not apply within 25 feet of aquatic habitats where TEP plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Glyphosate
- Since the risks associated with using a high boom are unknown, use only a low boom during ground applications of this herbicide within ½ mile of terrestrial TEP plant species.
- Do not apply by ground methods at the typical application rate within 50 feet of terrestrial TEP plant species.
- Do not apply by ground methods at the maximum application rate within 300 feet of terrestrial TEP plant species.
- Do not apply by aerial methods within 300 feet of terrestrial TEP plant species.

Imazapic
- Do not apply by ground methods within 25 feet of terrestrial TEP species or aquatic habitats where TEP plant species occur.
- Do not apply by helicopter at the typical application rate within 25 feet of terrestrial TEP plant species.
- Do not apply by helicopter at the maximum application rate, or by plane at the typical application rate, within 300 feet of terrestrial TEP plant species.
- Do not apply by plane at the maximum application rate within 900 feet of terrestrial TEP species.
- Do not apply by aerial methods at the maximum application rate within 300 feet of aquatic TEP species.
- Do not apply by aerial methods at the typical application rate within 100 feet of aquatic TEP species.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Picloram
- Do not apply by ground or aerial methods, at any application rate, within ½ mile of terrestrial TEP plant species.
- Assess local site conditions when evaluating the risks from surface water runoff to TEP plants located within ½ mile downgradient from the treatment area.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

The information provided in Table A-4 provides a general guideline as to the types of habitats in which treatments (particularly fire) may be utilized to improve growing conditions for TEP plant species. However, at the local level, the BLM must make a further determination as to the suitability of vegetation treatments for the populations of TEP species that are managed by local offices. The following information should be considered: the timing of the treatment in relation to the phenology of the TEP plant species; the intensity of the treatment; the duration of the treatment; and the tolerance of the TEP species to the particular type of treatment to be used. When information about species tolerance is unavailable or is inconclusive, local offices must assume a negative effect to plant populations, and protect those populations from direct exposure to the treatment in question.

Treatment plans must also address the presence of and expected impacts on noxious weeds on the project site. These plans must be coordinated with BLM weed experts and/or appropriate county weed supervisors to minimize the spread of weeds. In order to prevent the spread of noxious weeds and other unwanted vegetation in occupied or suitable habitat, the following precautions should be taken:

- Cleared areas that are prone to downy brome or other noxious weed invasions should be seeded with an appropriate seed mixture to reduce the probability of noxious weeds or other undesirable plants becoming established on the site.
- Where seeding is warranted, bare sites should be seeded as soon as appropriate after treatment, and at a time of year when it is likely to be successful.
- In suitable habitat for TEP species, nonnative species should not be used for revegetation.
- Certified noxious weed seed free seed must be used in suitable habitat, and preference should be given to seeding appropriate plant species when rehabilitation is appropriate.
- Straw and hay bales used for erosion control in suitable habitat must be certified weed- and seed-free.
- Vehicles and heavy equipment used during treatment activities should be washed prior to arriving at a new location to avoid the transfer of noxious weeds.

When BAs are drafted at the local level for treatment programs, additional conservation measures may be added to this list. Where BLM plans that consider the effects of vegetation treatments on TEP plant species already exist, these plans should be consulted, and incorporated (e.g., any guidance or conservation measures they provide) into local level BAs for vegetation treatments.

Aquatic Animals Conservation Measures

Many local BLM offices already have management plans in place that ensure the protection of these species, and have completed formal or informal consultations on similar treatment activities. These consultations have identified protection zones alongside aquatic habitats that support these species. The conservation measures discussed below are probable steps required of the BLM to ensure that vegetation treatments would minimize impacts to TEP species. These conservation measures are intended as broad guidance at the programmatic level; further analysis of treatment programs and species habitats at the local level is required to better reduce potential impacts from proposed vegetation treatments. Completion of

consultation at the local level will fine-tune conservation measures associated with treatment activities and ensure consistency of the treatments with ESA requirements.

The aquatic TEP species considered in this programmatic BA occur in varied habitats, over a large geographic area. The conservation measures guidance presented below is intended to apply broadly to aquatic species and habitats over the entire region covered by this BA, based on the common features found in nearly all aquatic and riparian habitats. Some species with alternate or unusual habitat requirements may require additional conservation measures to ensure a Not Likely to Adversely Affect determination at the local level. Such additional conservation measures are outside the scope of this BA, and will be completed at the local level.

Some local BLM plans have delineated protected riparian areas, or portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines (USDA Forest Service 1995). These protected riparian areas include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by 1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams; 2) providing root strength for channel stability; 3) shading the stream; and 4) protecting water quality. Examples of protected riparian areas are the BLM's Riparian Reserves of the Pacific Northwest and the Interior Columbia Basin, as described in the Aquatic Conservation Strategy (USDA Forest Service and USDI BLM 1994). The term "riparian areas," as used in the conservation measures guidance below, refers to riparian protected areas, wherever such designations apply. However, since not all local BLM plans have made such designations, "riparian areas," when the above-mentioned use is not applicable, generally refers to: 1) for streams, the stream channel and the extent of the 100-year floodplain; and 2) for wetlands, ponds, and lakes, and other aquatic habitats, the area extending to the edges of the riparian vegetation, provided it is no less than the minimum buffer distance for a given site established by local BLM biologists.

Conservation Measures for Site Access and Fueling/Equipment Maintenance

For treatments occurring in watersheds with TEP species or designated or undesignated critical habitat (i.e., unoccupied habitat critical to species recovery):

- Where feasible, access work site only on existing roads, and limit all travel on roads when damage to the road surface will result or is occurring.
- Where TEP aquatic species occur, consider ground-disturbing activities on a case by case basis, and implement Standard Operating Procedures to ensure minimal erosion or impact to the aquatic habitat.
- Within riparian areas, do not use vehicle equipment off of established roads.
- Outside of riparian areas, allow driving off of established roads only on slopes of 20% or less.
- Except in emergencies, land helicopters outside of riparian areas.
- Within 150 feet of wetlands or riparian areas, do not fuel/refuel equipment, store fuel, or perform equipment maintenance (locate all fueling and fuel storage areas, as well as service landings outside of protected riparian areas).
- Prior to helicopter fueling operations prepare a transportation, storage, and emergency spill plan and obtain the appropriate approvals; for other heavy equipment fueling

operations use a slip-tank not greater than 250 gallons; Prepare spill containment and cleanup provisions for maintenance operations.
- Do not conduct biomass removal (harvest) activities that will alter the timing, magnitude, duration, and spatial distribution of peak, high, and low flows outside the range of natural variability.

Conservation Measures Related to Herbicide Treatments

The complexity of this action within riparian areas requires local consultation, which will be based on herbicide risk assessments.

Possible Conservation Measures:
- Maintain equipment used for transportation, storage, or application of chemicals in a leak proof condition.
- Do not store or mix herbicides, or conduct post-application cleaning within riparian areas.
- Ensure that trained personnel monitor weather conditions at spray times during application.
- Strictly enforce all herbicide labels.
- Do not broadcast spray within 100 feet of open water when wind velocity exceeds 5 mph.
- Do not broadcast spray when wind velocity exceeds 10 mph.
- Do not spray if precipitation is occurring or is imminent (within 24 hours).
- Do not spray if air turbulence is sufficient to affect the normal spray pattern.
- Do not broadcast spray herbicides in riparian areas that provide habitat for TEP aquatic species. Appropriate buffer distances should be determined at the local level to ensure that overhanging vegetation that provides habitat for TEP species is not removed from the site. Buffer distances provided as conservation measures in the assessment of effects to plants (Chapter 4 of this BA) and fish and aquatic invertebrates should be consulted as guidance. (Note: the Forest Service did not determine appropriate buffer distances for TEP fish and aquatic invertebrates when evaluating herbicides in Forest Service ERAs; buffer distances were only determined for non-TEP species.)
- Do not use fluridone, terrestrial formulations of glyphosate, or triclopyr BEE, to treat aquatic vegetation in habitats where aquatic TEP species occur or may potentially occur.
- Avoid using glyphosate formulations that include R-11 in the future, and either avoid using any formulations with POEA, or seek to use the formulation with the lowest amount of POEA available, to reduce risks to aquatic organisms.
- Follow all instructions and Standard Operating Procedures to avoid spill and direct spray scenarios into aquatic habitats. Special care should be followed when transporting and applying 2,4-D, clopyralid, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, and triclopyr.
- Do not broadcast spray glyphosate, picloram, or triclopyr BEE in upland habitats adjacent to aquatic habitats that support (or may potentially support) aquatic TEP species under conditions that would likely result in off-site drift.

- In watersheds that support TEP species or their habitat, do not apply triclopyr BEE in upland habitats within ½ mile upslope of aquatic habitats that support aquatic TEP species under conditions that would likely result in surface runoff.

Numerous conservation measures were developed from information provided in ERAs. The measures listed below would apply to TEP fish and other aquatic species at the programmatic level in all 17 western states. However, local BLM field offices could use interactive spreadsheets and other information contained in the ERAs to develop more site-specific conservation measures and management plans based on local conditions (soil type, rainfall, vegetation type, and herbicide treatment method). It is possible that conservation measures would be less restrictive than those listed below if local site conditions were evaluated using the ERAs when developing project-level conservation measures.

Butterfly or Moth Conservation Measures

Many local BLM offices already have management plans in place that ensure the protection of these species during activities on public lands. The following conservation measures are the minimum steps required of the BLM to ensure that treatment methods would be unlikely to negatively affect TEP species.

Each local BLM office is required to draw up management plans related to treatment activities that identify any TEP butterfly or moth species or their critical habitat that are present in the proposed treatment areas, as well as the measures that will be taken to protect these species. Management plans should, at a minimum, follow this general guidance:

- Use an integrated pest management approach when designing programs for managing pest outbreaks.
- Survey treatment areas for TEP butterflies/moths and their host/nectar plants (suitable habitat) at the appropriate times of year.
- Minimize the disturbance area with a pre-treatment survey to determine the best access routes. Areas with butterfly/moth host plants and/or nectar plants should be avoided.
- Carry out vegetation removal in small areas, creating openings of 5 acres or less in size.
- Wash equipment before it is brought into the treatment area.
- To protect host and nectar plants from herbicide treatments, follow recommended buffer zones and other conservation measures for TEP plants species when conducting herbicide treatments in areas where populations of host and nectar plants occur.
- Do not broadcast spray herbicides in habitats occupied by TEP butterflies or moths; do not broadcast spray herbicides in areas adjacent to TEP butterfly/moth habitat under conditions when spray drift onto the habitat is likely.
- Do not use 2,4-D in TEP butterfly/moth habitat.
- When conducting herbicide treatments in or near habitat used by TEP butterflies or moths, avoid use of the following herbicides, where feasible: clopyralid, glyphosate, hexazinone, imazapyr, picloram, and triclopyr.
- If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation in TEP butterfly or moth habitat, utilize the typical, rather than the maximum, application rate.

Amphibians and Reptiles Conservation Measures

Many local BLM offices already have management plans in place that ensure the protection of these species during activities on public lands. In addition, the following conservation measures are the minimum steps required of the BLM to ensure that treatment methods would be unlikely to negatively affect TEP species.

Conservation measures:

- Survey all areas that may support TEP amphibians and/or reptiles prior to treatments.
- In habitats where aquatic herpetofauna occur, implement all conservation measures identified for aquatic organisms in Chapter 4.
- Within riparian areas, wetlands, and aquatic habitats, conduct herbicide treatments only with herbicides that are approved for use in those areas.
- Do not broadcast spray herbicides in riparian areas or wetlands that provide habitat for TEP herpetofauna.
- Do not use fluridone, glyphosate, or triclopyr BEE to treat aquatic vegetation in habitats where TEP amphibians occur or may potentially occur.
-
- When conducting herbicide treatments in upland areas adjacent to aquatic or wetland habitats that support TEP herpetofauna, do not broadcast spray during conditions under which off-site drift is likely.
- Follow all instructions and Standard Operating Procedures to avoid spill and direct spray scenarios into aquatic habitats that support TEP herpetofauna.
- Do not use 2,4-D in terrestrial habitats occupied by TEP herpetofauna; do not broadcast spray 2,4-D within ¼ mile of terrestrial habitat occupied by TEP herpetofauna.
- When conducting herbicide treatments in or near terrestrial habitat occupied by TEP herpetofauna, avoid using the following herbicides, where feasible: clopyralid, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, and triclopyr.
- When conducting herbicide treatments in upland habitats occupied by TEP herpetofauna, do not broadcast spray 2,4-D, clopyralid, glyphosate, hexazinone, picloram or triclopyr; do not broadcast spray these herbicides in areas adjacent to habitats occupied by TEP herpetofauna under conditions when spray drift onto the habitat is likely.
- If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation in upland habitats occupied by TEP herpetofauna, utilize the typical, rather than the maximum, application rate.
- If conducting herbicide treatments in or near upland habitats occupied by TEP herpetofauna, consult Table 6-3 on a species by species basis to determine additional conservation measures that should be enacted to avoid negative effects via ingestion of contaminated prey.

Fish Conservation Measures

Conservation measures have been incorporated into the proposed action to reduce negative effects to the point where they do not reduce the quantity or quality of EFH. For the purposes of developing conservation measures for salmon, riparian areas include traditional riparian

corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by 1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, 2) providing root strength for channel stability, 3) shading the stream, and 4) protecting water quality. Estuarine and coastal marine EFH of particular concern is described above for groundfish, pelagic fish, crabs, and scallops.

Activities associated with the proposed vegetation treatments would have the potential to negatively affect salmonids, pelagic fish and groundfish, and Alaskan crabs and scallops and their habitat. Implementation of the measures listed below would minimize these potential impacts to a negligible level such that the quantity and quality of EFH is not reduced.

General Riparian, Aquatic and Stream Conservation Measures Related to Fisheries

- Establish riparian, estuarine, and coastal buffer strips adjacent to salmonid, groundfish and pelagic fish, and Alaskan crab and scallop habitats to reduce direct impacts to the various life stages of these species. Buffers widths should depend on the specific ecological function for which protection is desired (e.g., streambanks stabilization, control of sediment inputs from surface erosion, or maintenance of shade to stream channels). Local BLM field offices would consult BLM and Forest Service ERAs prepared for the BA and PEIS to obtain programmatic guidance on appropriate buffer distances. Field offices can also input information on local site conditions (e.g., soil type, vegetation type, precipitation, treatment method) into interactive spreadsheets developed for the ERAs to develop more site-specific, and in most cases less restrictive, buffers for individual projects.
- Implement Standard Operating Procedures to minimize sedimentation and disturbance of riparian, estuarine, and coastal vegetation.
- To avoid erosion and future recreational uses within close vicinity of aquatic areas, limit or exclude construction of new permanent or temporary roads within the boundary of treatment riparian areas.
- Where possible, to avoid increased instream sedimentation, choose low-intensity burns and manual treatment methods over mechanical treatment methods and use of domestic animals.

General Herbicide Treatment Conservation Measures Related to Fisheries

- Where feasible, minimize spray operations around aquatic habitats to days when winds are > 10 miles per hour for ground applications, and > 6 miles per hours for aerial applications, to avoid wind drift or direct application of herbicides into these habitats.
- Where feasible, minimize the use of terrestrial herbicides (especially bromacil, diuron, and tebuthiuron) in watersheds with downgradient ponds and streams if potential impacts to salmonids are of concern.
- Time herbicide applications near salmonid-bearing streams, and estuaries and coastal/marine habitats used by salmon and FMP species so that they do not overlap with sensitive life-history stages of these fish (would vary at the local level).

APPENDIX B – TABLES

Appendix B-Table 1: Potential Herbicides and Application Rates By Weed Species

Weed Species	Herbicide(s)	Rate	Timing of Application
Medusahead rye, cheatgrass, ventenata, and other annual invasive species	*Imazapic*: Plateau	2-12 oz./acre	Best application window is as a pre-emergent in late summer/early fall
Perennial Mustards (perennial pepperweed, white top), invasive annual broad-leaves	*Chlorsulfuron:* Telar XP May add *2,4-D*	1-1.3 oz/acre 1-2 qts/acre	Best application window is full flower stage.
Dalmatian toadflax	*Chlorsulfuron:* Telar XP May add *2,4-D*	1-1.3 oz/acre 1-2 qts/acre	Best application window is fall regrowth stage but full flower stage works too.
Biennial thistles (Scotch, bull, musk) Mediterranean sage, puncturevine	*Chlorsulfuron:* Telar XP May add: *2,4-D* May add: *Clopyralid*	1-1.3 oz/acre 1-2 qts/acre 1-1.33 pts/acre	Best application window is rosette to bolt stage.
Canada thistle	*Chlorsulfuron:* Telar XP May add *2,4-D:* various May add *Clopyralid*: Transline	1-1.3 oz/acre 1-2 qts/acre 1-1.33 pts/acre	Best application window is fall regrowth stage but bud stage works too.
Knapweeds (diffuse, spotted, Russian)	*Clopyralid:* Transline May add *2,4-D:* various	1-1.33 pts/acre 1-2 qts/acre	Best application window is rosette to bolt stage for diffuse, bud to flower for spotted, and bud or fall regrowth stage for Russian.

Appendix B-Table 2: Summary of Environmental Effects of Use of Chlorsulfuron

Resource	Proposed Herbicide: Chlorsulfuron	Target Vegetation	Target Areas
Soils **(BLM 2010a, p. 182)**	*Chlorsulfuron* would be stable in neutral soils throughout the area. As with most biodegradation rates, the higher the pH, the slower the herbicide breaks down. The higher the temperature, soil moisture, organic matter content, and microbial biomass, the faster it breaks down. Chlorsulfuron is only mildly toxic to terrestrial microorganisms and effects are short term (transient) (SERA 2004a). Chlorsulfuron has high soil mobility (low soil adsorption), a 40 day half-life, and is moderately persistent in soil. Degradation is affected by soil pH (high pH translates to slower herbicide degradation) and has potential longevity on alkaline soils. The herbicide can remain active for more than a year, particularly on the slightly (pH 7.4-7.9) and moderately (pH 7.9- 9.4) alkaline soils within the Aridisols, Mollisols, Inceptisols, and Entisols soil orders (Sarmah *et al*. (1999)). Chlorsulfuron has a label advisory for wind erosion. It is registered for use on all land types except forest and where applications are applied directly to water, where surface water is present, or to intertidal areas below the mean high water mark.	Thistles, Mediterannean sage, black henbane, poison hemlock, Dalmatian toadflax, perennial pepperweed, puncturevine, whitetop, and invasive annual broadleaf plants.	Roadsides, Rangelands ROW, Reservoirs, meadows, riparian areas.
Water Quality, Riparian, and Wetlands (BLM 2010a, pp. 196 & 212)	*Chlorsulfuron* is persistent and mobile in some soils. In aquatic environments, the environmental fate of chlorsulfuron is related to pH and temperature. Hydrolysis rates are fastest in acidic waters and slower in more alkaline systems (Sarmah and Sabadie 2002). As hydrolysis rates drop, biodegradation becomes the mechanism affecting the breakdown of chlorsulfuron. Aquatic dissipation half-lives from 24 days to more than 365 days have been reported (ENSR 2005c), with a shorter time reported for flooded soil (47 to 86 days) than anaerobic aquatic systems (109 to 263 days; SERA 2004a). Chlorsulfuron is not known to be a groundwater contaminant, but has a high potential to leach into the groundwater. It is effective at low concentrations. Chlorsulfuron could be used to the water's edge in riparian and wetland areas. It will not be used where it could contact the water; therefore the adverse effect would be low to none on water quality. Chlorsulfuron would be an especially effective control for the noxious perennial mustards that are invading the area, such as perennial pepperweed and hoary cress.		

Resource	Proposed Herbicide: Chlorsulfuron	Target Vegetation	Target Areas
Fish and Other Aquatic Resources **(BLM 2010a, p. 224)**	Chlorsulfuron is a selective, ALS-inhibitor herbicide. It is not registered for use in aquatic systems. Chlorsulfuron's physical and chemical properties suggest that it is highly soluble in water, and is likely to remain dissolved in water and runoff from soils into water bodies. In addition, this herbicide has a long half-life inponds, but is not likely to bioconcentrate in aquatic wildlife. However, none of the evaluated scenarios, including accidental direct spray and spill of chlorsulfuron, poses any risk to fish in streams and ponds.		
Wildlife and Special Status Wildlife Species **(BLM 2010a, p. 248)**	*Chlorsulfuron* is an ALS-inhibitor; a group of herbicides that has the lowest risk to all groups of wildlife of the herbicides evaluated. All likely application scenarios are below the LOCs for wildlife groups under tested scenarios, even under spill or off-site drift scenarios. It is unlikely to cause any adverse effect on aquatic animals (Table 3-14). No studies on amphibians or reptiles were found (SERA 2004a).		
Grazing **(BLM 2010a, p. 261 & 269)**	*Chlorsulfuron* risk quotients for mammals for all modeled scenarios were below the conservative LOC of 0.1, indicating that direct spray and ingestion of sprayed vegetation is not likely to pose a risk to livestock (Table 3-14; ENSR 2005c). Based on label directions, there are no restrictions on livestock use of treated areas which is also applicable to wild horses.		
Special Status Plant Species and Upland Vegetation **(BLM 2010a, p. 145-146)**	*Chlorsulfuron*, an ALS-Inhibitor and sulfonylurea, works by inhibiting the activity of an enzyme called acetolactate synthase (ALS), which is necessary for plant growth. Chlorsulfuron is effective at very low dosages (half ounce to a few ounces per acre). Because of its high potency and longevity, this herbicide has potential to pose a particular risk to non-target plants. Off-site movement of even small concentrations of this herbicide could result in extensive damage to surrounding plants, and damage to non-target plants has potential to result in concentrations lower than those reportedly required to kill target invasive plants (Fletcher et al. 1996). ALS-inhibiting herbicides can quickly confer resistance to certain weed populations.		

Appendix B-Table 3: Summary of Environmental Effects of Use of Clopyralid

Resource	Proposed Herbicide: Clopyralid	Target Vegetation	Target Areas
Soils **(BLM 2010a, p. 182-184)**	*Clopyralid* is unstable in soil and is considered moderately persistent based on its half-life. Leaching potential within the area would be low since the majority of the soils are loams and clay, although there are some coarser-textured pockets. Biodegradation would be rapid in soil and thus the potential for leaching or runoff is low. Clopyralid can persist in plants and therefore can be introduced into the soil when plants die.	Thistles knapweeds	Roadsides, ROWs, dry meadows, and rangelands
Water Quality, Riparian, and Wetlands (BLM 2010a, pp. 196 & 213)	*Clopyralid* does not appear to bind tightly to soil and will leach under favorable conditions. However, leaching and subsequent contamination of groundwater appear to be minimal (SERA 2004b), which is consistent with a short-term monitoring study of clopyralid in surface water after an aerial application (Rice et al. 1997a cited in SERA 2004b). Clopyralid is not known to be a common groundwater contaminant, and no major off-site movement has been documented. Clopyralid does not bind with suspended particles in water; biodegradation in aquatic sediments is the main pathway for dissipation. The average half-life of clopyralid in water has been measured at 9 and 22 days (Dow AgroSciences 1998). *Clopyralid* is relatively non-toxic to aquatic plants. Overall, effects to non-target wetland and riparian vegetation from normal application of clopyralid are likely to be limited to susceptible plant species in or very near the treatment area, and could be avoided by maintaining an adequate buffer between the treatment area and wetland and riparian areas (SERA 2004b). Clopyralid is not likely to affect aquatic plants via off-site drift or surface runoff pathways unless spilled. More effective noxious weed control would lead to better vegetation cover, which in the long term could assist with better water infiltration.		
Fish and Other Aquatic Resources **(BLM 2010a, p. 224)**	No effects would occur as no treatment will take place with this herbicide directly to water or areas where surface water is present within riparian areas or wetlands or where soils have rapid to very rapid permeability throughout the profile (such as loamy sand to sand) .		

Resource	Proposed Herbicide: Clopyralid	Target Vegetation	Target Areas
Wildlife and Special Status Wildlife Species **(BLM 2010a, p. 248)**	*Clopyralid* is useful in treating starthistle, thistles, and knapweeds, which are noted as damaging to wildlife habitat. Clopyralid is unlikely to pose risk to terrestrial mammals. All of the estimated mammalian acute exposures are below the acute NOEL; mammalian chronic exposures are below the chronic NOEL. It is relatively "harmless" to earthworms (Dow AgroSciences 1998) and 14 of 17 insect parasites and predatory mites (Hassan et al. 1994 cited in SERA 2004b). There was no mortality to bees at relatively high doses. Four of 18 direct spray scenarios resulted in exposure levels below the estimated NOEL. Large and small birds have some risk of ingestion of contaminated food but hazard quotients are below the level of concern for all exposure scenarios. No studies on amphibians/reptiles were found. Clopyralid is one of the herbicides with lower toxic risks (SERA 2004b).		
Grazing **(BLM 2010a, p. 262)**	*Clopyralid*: Large mammals face low acute risks from direct spray and from consumption of contaminated grass at the typical and maximum application rates. The maximum application rate also poses a low chronic risk to large mammals consuming on-site contaminated vegetation. All risks identified fall within the lowest risk category; adverse effects to livestock are unlikely with expected exposure scenarios. According to label directions, there are no restrictions on grazing or hay harvest following application at labeled rates, but livestock should not be transferred from treated grazing areas to susceptible broadleaf crop areas without first allowing for 7 days of grazing on untreated pasture. Clopyralid would allow for more effective weed control, which could increase the carrying capacity of the treated allotments.		
Special Status Plant Species and Upland Vegetation **(BLM 2010a, p. 145)**	*Clopyralid* is a selective herbicide that limits enzyme activity, and focuses on broadleaf weeds and grasses. Clopyralid is more selective and less persistent than picloram. Clopyralid is relatively non-toxic to aquatic plants; however, accidental spills have potential to result in temporary growth inhibition of aquatic plants. Many of our important, desirable tree and shrub species are tolerant of clopyralid. Clopyralid has little effect on grasses and members of the mustard family. Overall effects to non-target plants from normal application of clopyralid would likely be limited to susceptible plant species in or very near the treatment area. Removal of noxious weeds would improve the upland vegetation and allow for more habitats for special status plant species.		

Appendix B-Table 4: Summary of Environmental Effects of Use of Imazapic

Resource	Proposed Herbicide: Imazapic	Target Vegetation	Target Areas
Soils (BLM 2010a, p. 182-184)	*Imazapic* is moderately persistent in soils and has not been found to move laterally with surface water. Most imazapic is lost through biodegradation. Sorption to soil increases with decreasing pH and increasing organic matter and clay content. The project area has relatively high pH and clay content.	Medusahead rye, Cheatgrass, African wiregrass (Ventenata)	Roadsides, Rangelands, ROWs
Water Quality, Riparian, and Wetlands (BLM 2010a, pp. 197 & 212, and 224)	Imazapic has low potential to leach into the groundwater. Imazapic would have very high water solubility and negligible to slight potential for transport in surface runoff, due to its adsorption potential with soil and organic matter. In addition, imazapic is rapidly degraded by sunlight in aqueous solution, with a half-life of one or two days. In aquatic systems, imazapic rapidly photodegrades with a half-life of 1 to 2 days (Tu et al. 2001). Aquatic dissipation half-lives have been reported from 30 days (water column) to 6.7 years in anaerobic sediments (SERA 2004c). Little is known about the occurrence, fate, or transport of imazapic in surface water or groundwater (Battaglin et al. 2000). However, according to the herbicide label for Plateau, in which imazapic is the active ingredient, it is believed to be a groundwater contaminant (BASF 2008). *Imazapic* risk to aquatic plants from accidental spills of imazapic is moderate to high at the maximum application rate and low to moderate at the typical application rate (there is no acute risk to aquatic plants in standing water at the typical application rate). Aquatic plants are generally not at risk from off-site drift of imazapic, except when applied aerially at the maximum application rate with a buffer of 100 feet or less. *Imazapic*, an ALS-inhibitor, is a selective, systemic herbicide. It would not be used for treatment of aquatic vegetation, but could be used in riparian areas. Due to these characteristics and the SOPs that would be employed, impacts to water resources impacts are not anticipated to be significant from proposed imazapic applications.		
Fish and Other Aquatic Resources (BLM 2010a, p. 225)	*Imazapic* would be moderately toxic to fish, but is not proposed for aquatic use. The average half-life for imazapic in a pond is 30 days, and this herbicide has little tendency to bioaccumulate in fish (Barker et al. 1998). According to the manufacturer's label, imazapic has a high runoff potential from soils for several months or more after application. Accidental direct spray and spill scenarios generally pose no risk to fish when imazapic is applied at either the typical or maximum application rate. Risk Assessments show fish are not at risk from off-site drift or surface runoff of imazapic. No treatment will take place directly to water, or to areas where surface water is present with this herbicide. Adjuvants will be used to minimize drift and help bind the herbicide to the site of application.		

Resource	Proposed Herbicide: Imazapic	Target Vegetation	Target Areas
Wildlife and Special Status Wildlife Species (BLM 2010a, p. 249)	*Imazapic* is an ALS-inhibitor that rapidly metabolizes and does not bioaccumulate. It is effective against medusahead, leafy spurge, and cheatgrass, which adversely affect wildlife habitat. Imazapic is not highly toxic to most terrestrial animals. Mammals are more susceptible during pregnancy and larger mammals are more susceptible than small mammals. Imazapic has low toxicity to honeybees. No adverse short-term exposure risks to birds were noted for imazapic, but some chronic growth reduction was noted. None of the risk categories for susceptible or non-susceptible shows any ratings that exceed the LOC. Imazapic is one of the lowest toxic risks to wildlife of herbicides evaluated in this EIS along with other ALS-Inhibitors (SERA 2004c). The use in rangeland and other wildlife habitat areas would benefit wildlife by controlling invasive plant species, especially annual grass species. And would promote the establishment and growth of native plant species that provide more suitable wildlife habitat and forage.		
Grazing (BLM 2010a, p. 261)	*Imazapic*: Risk quotients for terrestrial animals were all below the most conservative LOC of 0.1, indicating that direct spray or drift of imazapic would be unlikely to pose a risk to livestock (Table 3-14; ENSR 2005h). Based on label directions, there are no restrictions on livestock use of treated areas. Imazapic will typically be applied in the fall as a pre-emergent, minimizing potential ingestion and therefore effects to the livestock that use the allotment.		
Special Status Plant Species and Upland Vegetation (BLM 2010a, p. 145)	*Imazapic*, an ALS-Inhibitor and sulfonylurea, works by inhibiting the activity of an enzyme called acetolactate synthase (ALS), which is necessary for plant growth. Imazapic would be applied at a very low dose (6-8 ounces per acre). Because of the high potency and longevity, this herbicide can pose a particular risk to non-target plants. Off-site movement of even small concentration of this herbicide can result in extensive damage to surrounding plants. Since imazapic would be applied early fall most of the native vegetation would be dormant. The key grass species found in the project area are Blue-bunch wheatgrass (*Pseudoroegneria spicata)*, Thurbers needlegrass *(Achnatherum thurberianum)*, squirreltail *(Elymus elymodies)*, Sandberg's bluegrass *(Poa sandbergii)*, Idaho fescue *(Festuca idahoensis)*, crested wheatgrass (*Agropyron cristatum*), basin wildrye *(Elymus cinereus)*, and Inland saltgrass *(Distichlis stricta).* These species would be tolerant to imazapic up to a rate of 12 ounces per acre (which is much higher than the rate we would be applying in the project area).		

APPENDIX C: STANDARD OPERATING PROCEDURES AND MITIGATION MEASURES, EXCERPTED FROM THE VEGETATION TREATMENTS USING HERBICIDES ON BLM LANDS IN OREGON FEIS/ROD (2010) (PP. 457-467)

Introduction

The following Standard Operating Procedures and Mitigation Measures have been adopted from the Record of Decision for the PEIS. Minor edits have been made to some Standard Operating Procedures and Mitigation Measures to clarify intent.

Standard Operating Procedures (identified below with SOP) 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.1 The list is not all encompassing, but is designed to give an overview of practices that would be considered when designing and implementing a vegetation treatment project on public lands (PER: 2-29)2. Effects described in the EIS are predicated on application of the Standard Operating Procedures, that a site-specific determination is made that their application is unnecessary to achieve their intended purpose or protection, or that if the parent handbook or policy direction evolves, the new direction would continue to provide the appropriate environmental protections.

For example, the Standard Operating Procedure to "complete vegetation treatments seasonally before pollinator foraging plants bloom" would not be applied to treatments not likely to have a significant effect on pollinators.

PEIS Mitigation Measures (identified below with MM) were identified for all potential adverse effects identified in the PEIS. They are included in, and adopted by, the Record of Decision for the PEIS. Like the SOPs, application of the mitigation measures is assumed in this EIS. However, for PEIS Mitigation Measures, site-specific analysis and/or the use of Individual Risk Assessments Tools (see Chapter 3), or evolution of the PEIS Mitigation Measures into handbook direction at the national level, would be permitted to identify alternative ways to achieve the expected protections (PEIS:4-4).

Although not displayed here, Standard Operating Procedures for non-herbicide treatments (from regulation, BLM policy, and BLM Handbook direction) also apply (PER: 2-31 to 44).

The Herbicides - The seven herbicides proposed for use in Bendire Complex are a subset of the hundreds of herbicides registered for use in the U.S. They were chosen for noxious weed and invasive grass treatments within Bendire Complex for maximum effectiveness against the known noxious and invasive species and because they have the least environmental and non-target species' risks. Table 2.2 in Chapter 2 shows the seven herbicides with some sample trade names, common plant targets, plant types it is selective for, how it is used, land types it is registered for, typical and maximum rates, and whether it can be applied aerially.

Table C-1 - ***Summary of Herbicides by Registered Site-Types, Application Methods, and General Constraints from the Labels*** supplements the Table 2.2 information by listing potential application methods and a summary of general label constraints.

Herbicides can be categorized as selective or non-selective (see Table 2-2). Selective herbicides kill only a specific type of plant. For example, an herbicide selective for broadleaved plants can be used to manage such species while maintaining desirable grass species in rangeland communities. Non-selective herbicides kill all types of plants, and thus must be applied only to the target species. Herbicides can be used selectively to control specific types of vegetation (e.g., killing a specific invasive species), or non-selectively in monocultures of invasive plants where there is no objective to retain some plants. Some herbicides are post-emergent, which means they can be used to kill existing vegetation; others are pre-emergent, which stops vegetation before it grows (e.g., prohibiting seeds from germinating) (Table2.2).

Table C-2 – ***Herbicide Formulations Approved for use on BLM Lands*** displays the BLM National list of approved herbicides, which is reviewed and updated at least annually.

Table C-3 – ***Adjuvants Approved for Use on BLM Administered Lands*** displays the adjuvants approved for use on BLM lands nationally. This list is also reviewed at least annually.

Appendix C - Table 1: Summary of Herbicides by Registered Site-Types, Application Methods, and General Constraints from the Labels

Herbicides	Registered for: Programs/Treatment Areas	Application Method	General Constraints from Label *(follow all label requirements)*
2,4-D	Rangeland Public domain forestland Energy and mineral sites Rights-of-way Recreation ESR Riparian (specific formulations)	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Toxic to aquatic invertebrates. • Only use approved formulations for streamside applications. • Drift or runoff may adversely affect aquatic invertebrates and non-target plants. • For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash waters.
Chlorsulfuron	Rangeland Energy and mineral sites Rights-of-way Recreation ESR Riparian/wetland	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Do not apply more than 1.33 oz/acre per year in pasture, range, and CRP treatments. • Do not treat frozen soil. • Applications to powdery, dry soil when there is low likelihood of rain soon may result in off-site damage by wind-borne soil particles.
Clopyralid	Rangeland Public domain forestland Energy and mineral sites Rights-of-way Recreation ESR	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Do not apply where soils have a rapid to very rapid permeability close to aquifers. • Do not contaminate irrigation ditches or water used for irrigation or domestic uses. • Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. • Do not contaminate water when disposing of equipment wash-water. • Avoid spray drift.
Dicamba	Rangeland Public domain forestland Energy Mineral sites Rights-of-way Recreation ESR	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• To prevent point source contamination, do not mix or load this pesticide within 50 feet of wells (including abandoned wells and drainage wells), sink holes, perennial or intermittent streams and rivers, and natural or impounded lakes and reservoirs. Do not apply this pesticide within 50 feet of wells. • Do not apply under conditions which favor runoff. Do not apply to impervious substrates such as paved or highly compacted surfaces in areas with high potential for ground water contamination. Ground water contamination may occur in areas where soils are permeable or coarse and ground water is near the surface.
Glyphosate	Aquatic Riparian/wetland Rangeland Public domain forestland Energy Mineral sites Rights-of-way Recreation ESR	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Only use approved aquatic formulations for aquatic applications. • Do not contaminate water when cleaning equipment or disposing of equipment washwaters. • Consult local state fish and game agency and water control authorities before applying this product to public water. • Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of plants which can cause fish suffocation. • This is a non-selective herbicide. • Avoid drift.

Herbicides	Registered for: Programs/Treatment Areas	Application Method	General Constraints from Label *(follow all label requirements)*
Imazapic	Rangeland Public domain forestland Energy and mineral sites Rights-of-way Recreation ESR	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. • Do not contaminate water when disposing of equipment wash-water. • To reduce run-off, avoid applications when rain is forecast w/in 48 hours.
Picloram	Rangeland Public domain forestland Energy and mineral sites Rights-of-way Recreation ESR	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Restricted use. May injure susceptible, non-target plants. This herbicide is injurious to plants at extremely low concentrations. Nontarget plants may be adversely affected from drift and run-off. • Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. • Do not make application when circumstances favor movement from treatment site. Do not contaminate water or water sources when mixing, loading, or disposing of equipment wash-water. • May leach thru soil and contaminate ground water where soils are permeable, particularly where water table is shallow.

Appendix C-2: Herbicide Formulations Approved for use on BLM Lands[1]

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
2, 4-D	Agrisolution 2,4-D LV6	Agriliance, L.L.C.	1381-101	5.6	Lbs. a.e[2]. / gal.
2, 4-D	Agrisolution 2,4-D Amine 4	Agriliance, L.L.C.	1381-103	3.8	Lbs. a.e. / gal.
2, 4-D	Agrisolution 2,4-D LV4	Agriliance, L.L.C.	1381-102	3.8	Lbs. a.e. / gal.
2, 4-D	2,4-D Amine 4	Albaugh, Inc./Agri Star	42750-19	3.8	Lbs. a.e. / gal.
2, 4-D	2,4-D LV 4	Albaugh, Inc./Agri Star	42750-15	3.8	Lbs. a.e. / gal.
2, 4-D	Solve 2,4-D	Albaugh, Inc./Agri Star	42750-22	3.76	Lbs. a.e. / gal.
2, 4-D	2,4-D LV 6	Albaugh, Inc./Agri Star	42750-20	5.5	Lbs. a.e. / gal.
2, 4-D	Five Star	Albaugh, Inc./Agri Star	42750-49	5.0	Lbs. a.e. / gal.
2, 4-D	D-638	Albaugh, Inc./Agri Star	42750-36	2.8	Lbs. a.e. / gal.
2, 4-D	Alliagre 2,4-D Amine	Alligare, LLC	81927-38	3.8	Lbs. a.e. / gal.
2, 4-D	2,4-D LV6	Helena Chemical Company	42750-20-5905	5.5	Lbs. a.e. / gal.
2, 4-D	2,4-D Amine	Helena Chemical Company	5905-72	3.76	Lbs. a.e. / gal.
2, 4-D	2,4-D Amine 4	Helena Chemical Company	42750-19-5905	3.8	Lbs. a.e. / gal.
2, 4-D	Opti-Amine	Helena Chemical Company	5905-501	3.8	Lbs. a.e. / gal.
2, 4-D	Barrage HF	Helena Chemical Company	5905-529	4.7	Lbs. a.e. / gal.
2, 4-D	HardBall	Helena Chemical Company	5905-549	1.74	Lbs. a.e. / gal.
2, 4-D	Unison	Helena Chemical Company	5905-542	1.74	Lbs. a.e. / gal.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
2, 4-D	Clean Amine	Loveland Products Inc.	34704-120	3.74	Lbs. a.e. / gal.
2, 4-D	Low Vol 4 Ester Weed Killer	Loveland Products Inc.	34704-124	3.8	Lbs. a.e. / gal.
2, 4-D	Low Vol 6 Ester Weed Killer	Loveland Products Inc.	34704-125	5.6	Lbs. a.e. / gal.
2, 4-D	Saber	Loveland Products Inc.	34704-803	3.8	Lbs. a.e. / gal.
2, 4-D	Salvo	Loveland Products Inc.	34704-609	5	Lbs. a.e. / gal.
2, 4-D	Savage DS	Loveland Products Inc.	34704-606	78.9	% a.e.
2, 4-D	Aqua-Kleen	Nufarm Americas Inc.	71368-4	19	% a.e.
2, 4-D	Aqua-Kleen	Nufarm Americas Inc.	228-378	19	% a.e.
2, 4-D	Esteron 99C	Nufarm Americas Inc.	62719-9-71368	3.8	Lbs. a.e. / gal.
2, 4-D	Weedar 64	Nufarm Americas Inc.	71368-1	3.8	Lbs. a.e. / gal.
2, 4-D	Weedone LV-4	Nufarm Americas Inc.	228-139-71368	3.84	Lbs. a.e. / gal.
2, 4-D	Weedone LV-4 Solventless	Nufarm Americas Inc.	71368-14	3.8	Lbs. a.e. / gal.
2, 4-D	Weedone LV-6	Nufarm Americas Inc.	71368-11	5.4	Lbs. a.e. / gal.
2, 4-D	Formula 40	Nufarm Americas Inc.	228-357	3.67	Lbs. a.e. / gal.
2, 4-D	2,4-D LV 6 Ester	Nufarm Americas Inc.	228-95	5.5	Lbs. a.e. / gal.
2, 4-D	Platoon	Nufarm Americas Inc.	228-145	3.8	Lbs. a.e. / gal.
2, 4-D	WEEDstroy AM-40	Nufarm Americas Inc.	228-145	3.8	Lbs. a.e. / gal.
2, 4-D	Hi-Dep	PBI Gordon Corp.	2217-703	3.8	Lbs. a.e. / gal.
2, 4-D	2,4-D Amine	Setre (Helena)	5905-72	3.76	Lbs. a.e. / gal.
2, 4-D	Barrage LV Ester	Setre (Helena)	5905-504	4.7	Lbs. a.e. / gal.
2, 4-D	2,4-D LV4	Setre (Helena)	5905-90	3.8	Lbs. a.e. / gal.
2, 4-D	2,4-D LV6	Setre (Helena)	5905-93	5.8	Lbs. a.e. / gal.
2, 4-D	Clean Crop Amine 4	UAP-Platte Chem. Co.	34704-5 CA	3.8	Lbs. a.e. / gal.
2, 4-D	Clean Crop Low Vol 6 Ester	UAP-Platte Chem. Co.	34704-125	5.6	Lbs. a.e. / gal.
2, 4-D	Salvo LV Ester	UAP-Platte Chem. Co.	34704-609	5.0	Lbs. a.e. / gal.
2, 4-D	2,4-D 4# Amine Weed Killer	UAP-Platte Chem. Co.	34704-120	3.74	Lbs. a.e. / gal.
2, 4-D	Clean Crop LV-4 ES	UAP-Platte Chem. Co.	34704-124	3.8	Lbs. a.e. / gal.
2, 4-D	Savage DS	UAP-Platte Chem. Co.	34704-606	78.9	% a.e.
2, 4-D	Cornbelt 4 lb. Amine	Van Diest Supply Co.	11773-2	3.8	Lbs. a.e. / gal.
2, 4-D	Cornbelt 4# LoVol Ester	Van Diest Supply Co.	11773-3	3.8	Lbs. a.e. / gal.
2, 4-D	Cornbelt 6# LoVol Ester	Van Diest Supply Co.	11773-4	5.6	Lbs. a.e. / gal.
2, 4-D	Amine 4	Wilbur-Ellis Co.	2935-512	3.8	Lbs. a.e. / gal.
2, 4-D	Base Camp Amine 4	Wilbur-Ellis Co.	71368-1-2935	3.8	Lbs. a.e. / gal.
2, 4-D	Base Camp LV6	Wilbur-Ellis Co.	2935-553	5.5	Lbs. a.e. / gal.
2, 4-D	Broadrange 55	Wilbur-Ellis Co.	2217-813-2935	5.03	Lbs. a.e. / gal.
2, 4-D	Lo Vol-4	Wilbur-Ellis Co.	228-139-2935	3.8	Lbs. a.e. / gal.
2, 4-D	Lo Vol-6 Ester	Wilbur-Ellis Co.	228-95-2935	5.5	Lbs. a.e. / gal.
2, 4-D	Agrisolution 2,4-D LV6	Winflied Solutions, LLC	1381-101	5.6	Lbs. a.e. / gal.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
2, 4-D	Agrisolution 2,4-D Amine 4	Winfield Solutions, LLC	1381-103	3.8	Lbs. a.e. / gal.
2, 4-D	Agrisolution 2,4-D LV4	Winfield Solutions, LLC	1381-102	3.8	Lbs. a.e. / gal.
2, 4-D	Phenoxy 088	Winfield Solutions, LLC	42750-36-9779	2.8	Lbs. a.e. / gal.
2,4-D	Alligare 2,4-D LV 6	Alligare, LLC	81927-39	5.5	Lbs. a.e. / gal.
2,4-D	Rugged	Winfield Solutions, LLC	1381-247	3.5	Lbs. a.e. / gal.
2,4-D	Shredder	Winfield Solutions, LLC	1381-195	6.0	Lbs. a.e. / gal.
Chlorsulfuron	Alligare Chlorsulfuron	Alligare, LLC	81927-43	75	% a.i[3].
Chlorsulfuron	Chlorsulfuron	Alligare, LLC	81927-43	75	% a.i.
Chlorsulfuron	Telar DF	DuPont Crop Protection	352-522	75	% a.i.
Chlorsulfuron	Telar XP	DuPont Crop Protection	352-654	75	% a.i.
Chlorsulfuron	Nufarm Chlorsulf SPC 75 WDG Herbicide	Nufarm Americas Inc.	228-672	75	% a.i.
Chlorsulfuron	Chlorsulfuron E-Pro 75 WDG	Nufarm Americas Inc.	79676-72	75	% a.i.
Clopyralid	Spur	Albaugh, Inc.	42750-89	3.0	Lbs. a.e. / gal.
Clopyralid	Pyramid R&P	Albaugh, Inc.	42750-94	3.0	Lbs. a.e. / gal.
Clopyralid	Clopyralid	Alligare, LLC	81927-14	3.0	Lbs. a.e. / gal.
Clopyralid	Clopyralid 3	Alligare, LLC	42750-94-81927	3.0	Lbs. a.e. / gal.
Clopyralid	Cody Herbicide	Alligare, LLC	81927-28	3.0	Lbs. a.e. / gal.
Clopyralid	Reclaim	Dow AgroSciences	62719-83	3.0	Lbs. a.e. / gal.
Clopyralid	Stinger	Dow AgroSciences	62719-73	3.0	Lbs. a.e. / gal.
Clopyralid	Transline	Dow AgroSciences	62719-259	3.0	Lbs. a.e. / gal.
Clopyralid	CleanSlate	Nufarm Americas Inc.	228-491	3.0	Lbs. a.e. / gal.
Dicamba	Dicamba DMA	Albaugh, Inc./Agri Star	42750-40	4.0	Lbs. a.e. / gal.
Dicamba	Vision	Albaugh, Inc.	42750-98	3.8	Lbs. a.e. / gal.
Dicamba	Cruise Control	Alligare, LLC	42750-40-81927	4.0	Lbs. a.e. / gal.
Dicamba	Banvel	Arysta LifeScience N.A. Corp.	66330-276	4.0	Lbs. a.e. / gal.
Dicamba	Clarity	BASF Corporation	7969-137	4.0	Lbs. a.e. / gal.
Dicamba	Vision	Helena Chemical Company	5905-576	4.0	Lbs. a.e. / gal.
Dicamba	Rifle	Loveland Products Inc.	34704-861	4.0	Lbs. a.e. / gal.
Dicamba	Banvel	Micro Flo Company	51036-289	4.0	Lbs. a.e. / gal.
Dicamba	Diablo	Nufarm Americas Inc.	228-379	4.0	Lbs. a.e. / gal.
Dicamba	Vanquish Herbicide	Nufarm Americas Inc.	228-397	4.0	Lbs. a.e. / gal.
Dicamba	Vanquish	Syngenta	100-884	4.0	Lbs. a.e. / gal.
Dicamba	Sterling Blue	Winfield Solutions, LLC	7969-137-1381	4.0	Lbs. a.e. / gal.
Dicamba + 2, 4-D	Range Star	Albaugh, Inc./Agri Star	42750-55	1.0 + 2.87	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Dicamba + 2,4-D DMA	Alligare, LLC	81927-42	1.0 + 2.87	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Weedmaster	BASF Corporation	7969-133	1.0 + 2.87	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Brush-Rhap	Helena Chemical Company	5905-568	1.8 + 2.4	Lbs. a.e. / gal., respectively

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
Dicamba + 2, 4-D	Latigo	Helena Chemical Company	5905-564	1.8 + 2.4	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Outlaw	Helena Chemical Company	5905-574	1.09 + 1.45	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Rifle-D	Loveland Products Inc.	34704-869	1.0 + 2.88	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	KambaMaster	Nufarm Americas Inc.	71368-34	1.0 + 2.87	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Weedmaster	Nufarm Americas Inc.	71368-34	1.0 + 2.87	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Veteran 720	Nufarm Americas Inc.	228-295	1.0 + 1.9	Lbs. a.e. / gal., respectively
Dicamba + 2, 4-D	Brash	Winfield Solutions, LLC	1381-202	1.0 + 2.87	Lbs. a.e. / gal., respectively
Glyphosate	Aqua Star	Albaugh, Inc./Agri Star	42750-59	4.0	Lbs. a.e. / gal.
Glyphosate	Forest Star	Albaugh, Inc./Agri Star	42570-61	3.0	Lbs. a.e. / gal.
Glyphosate	Gly Star Gold	Albaugh, Inc./Agri Star	42750-61	3.0	Lbs. a.e. / gal.
Glyphosate	Gly Star Original	Albaugh, Inc./Agri Star	42750-60	3.0	Lbs. a.e. / gal.
Glyphosate	Gly Star Plus	Albaugh, Inc./Agri Star	42750-61	3.0	Lbs. a.e. / gal.
Glyphosate	Gly Star Pro	Albaugh, Inc./Agri Star	42750-61	3.0	Lbs. a.e. / gal.
Glyphosate	Glyphosate 4 PLUS	Alligare, LLC	81927-9	3.0	Lbs. a.e. / gal.
Glyphosate	Glyphosate 4 +	Alligare, LLC	81927-9	3.0	Lbs. a.e. / gal.
Glyphosate	Glyphosate 5.4	Alligare, LLC	81927-8	4.0	Lbs. a.e. / gal.
Glyphosate	Glyfos	Cheminova	4787-31	3.0	Lbs. a.e. / gal.
Glyphosate	Glyfos PRO	Cheminova	67760-57	3.0	Lbs. a.e. / gal.
Glyphosate	Glyfos Aquatic	Cheminova	4787-34	4.0	Lbs. a.e. / gal.
Glyphosate	ClearOut 41 Plus	Agrisel USA, Inc.	70829-3	3.0	Lbs. a.e. / gal.
Glyphosate	Accord Concentrate	Dow AgroSciences	62719-324	4.0	Lbs. a.e. / gal.
Glyphosate	Accord SP	Dow AgroSciences	62719-322	3.0	Lbs. a.e. / gal.
Glyphosate	Accord XRT	Dow AgroSciences	62719-517	4.0	Lbs. a.e. / gal.
Glyphosate	Accord XRT II	Dow AgroSciences	62719-556	4.0	Lbs. a.e. / gal.
Glyphosate	Glypro	Dow AgroSciences	62719-324	4.0	Lbs. a.e. / gal.
Glyphosate	Glypro Plus	Dow AgroSciences	62719-322	3.0	Lbs. a.e. / gal.
Glyphosate	Rodeo	Dow AgroSciences	62719-324	4.0	Lbs. a.e. / gal.
Glyphosate	Showdown	Helena Chemical Company	71368-25-5905	3.0	Lbs. a.e. / gal.
Glyphosate	Mirage	Loveland Products Inc.	34704-889	3.0	Lbs. a.e. / gal.
Glyphosate	Mirage Plus	Loveland Products Inc.	34704-890	3.0	Lbs. a.e. / gal.
Glyphosate	Aquamaster	Monsanto	524-343	4.0	Lbs. a.e. / gal.
Glyphosate	Roundup Custom	Monsanto	524-343	4.0	Lbs. a.e. / gal.
Glyphosate	Roundup Original	Monsanto	524-445	3.0	Lbs. a.e. / gal.
Glyphosate	Roundup Original II	Monsanto	524-454	3.0	Lbs. a.e. / gal.
Glyphosate	Roundup Original II CA	Monsanto	524-475	3.0	Lbs. a.e. / gal.
Glyphosate	Honcho	Monsanto	524-445	3.0	Lbs. a.e. / gal.
Glyphosate	Honcho Plus	Monsanto	524-454	3.0	Lbs. a.e. / gal.
Glyphosate	Roundup PRO	Monsanto	524-475	3.0	Lbs. a.e. / gal.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
Glyphosate	Roundup PRO Concentrate	Monsanto	524-529	3.7	Lbs. a.e. / gal.
Glyphosate	Roundup PRO Dry	Monsanto	524-505	64.9	% a.e.
Glyphosate	Roundup PROMAX	Monsanto	524-579	4.5	Lbs. a.e. / gal.
Glyphosate	Aqua Neat	Nufarm Americas Inc.	228-365	4.0	Lbs. a.e. / gal.
Glyphosate	Credit Xtreme	Nufarm Americas Inc.	71368-81	4.5	Lbs. a.e. / gal.
Glyphosate	Foresters	Nufarm Americas Inc.	228-381	4.0	Lbs. a.e. / gal.
Glyphosate	Razor	Nufarm Americas Inc.	228-366	3.0	Lbs. a.e. / gal.
Glyphosate	Razor Pro	Nufarm Americas Inc.	228-366	3.0	Lbs. a.e. / gal.
Glyphosate	GlyphoMate 41	PBI/Gordon Corporation	2217-847	2.8	Lbs. a.e. / gal.
Glyphosate	AquaPro Aquatic Herbicide	SePRO Corporation	62719-324-67690	4.0	Lbs. a.e. / gal.
Glyphosate	Rattler	Setre (Helena)	524-445-5905	3.0	Lbs. a.e. / gal.
Glyphosate	Buccaneer	Tenkoz	55467-10	3.0	Lbs. a.e. / gal.
Glyphosate	Buccaneer Plus	Tenkoz	55467-9	3.0	Lbs. a.e. / gal.
Glyphosate	Mirage Herbicide	UAP-Platte Chem. Co.	524-445-34704	3.0	Lbs. a.e. / gal.
Glyphosate	Mirage Plus Herbicide	UAP-Platte Chem. Co.	524-454-34704	3.0	Lbs. a.e. / gal.
Glyphosate	Gly-4 Plus	Universal Crop Protection Alliance	72693-1	3.0	Lbs. a.e. / gal.
Glyphosate	Gly-4 Plus	Universal Crop Protection Alliance	42750-61-72693	3.0	Lbs. a.e. / gal.
Glyphosate	Gly-4	Universal Crop Protection Alliance	42750-60-72693	3.0	Lbs. a.e. / gal.
Glyphosate	Glyphosate 4	Vegetation Man., LLC	73220-6-74477	3.0	Lbs. a.e. / gal.
Glyphosate	Agrisolutions Cornerstone	Winfield Solutions, LLC	1381-191	3.0	Lbs. a.e. / gal.
Glyphosate	Agrisolutions Cornerstone Plus	Winfield Solutions, LLC	1381-192	3.0	Lbs. a.e. / gal.
Glyphosate	Agrisolutions Rascal	Winfield Solutions, LLC	1381-191	3.0	Lbs. a.e. / gal.
Glyphosate	Agrisolutions Rascal Plus	Winfield Solutions, LLC	1381-192	3.0	Lbs. a.e. / gal.
Glyphosate	Cornerstone 5 Plus	Winfield Solutions, LLC	1381-241	4.0	Lbs. a.e. / gal.
Imazapic	Panoramic 2SL	Alligare, LLC	66222-141-81927	2.0	Lbs. a.e. / gal.
Imazapic	Plateau	BASF Corporation	241-365	2.0	Lbs. a.e. / gal.
Imazapic	Nufarm Imazapic 2SL	Nufarm Americas Inc.	71368-99	2.0	Lbs. a.e. / gal.
Picloram	Triumph K	Albaugh, Inc.	42750-81	2.0	Lbs. a.e. / gal.
Picloram	Triumph 22K	Albaugh, Inc.	42750-79	2.0	Lbs. a.e. / gal.
Picloram	Picloram K	Alligare, LLC	81927-17	2.0	Lbs. a.e. / gal.
Picloram	Picloram 22K	Alligare, LLC	81927-18	2.0	Lbs. a.e. / gal.
Picloram	Grazon PC	Dow AgroSciences	62719-181	2.0	Lbs. a.e. / gal.
Picloram	OutPost 22K	Dow AgroSciences	62719-6	2.0	Lbs. a.e. / gal.
Picloram	Tordon K	Dow AgroSciences	62719-17	2.0	Lbs. a.e. / gal.
Picloram	Tordon 22K	Dow AgroSciences	62719-6	2.0	Lbs. a.e. / gal.
Picloram	Trooper 22K	Nufarm Americas Inc.	228-535	2.0	Lbs. a.e. / gal.

1. Updated September 30, 2015. 2. a.e.= acid equivalent 3. a.i. = active ingredient

Appendix C - Table 3: Adjuvants Approved for Use on BLM Administered Lands[1]

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
Surfactants			
Non-ionic	Agrisolutions Preference	Agriliance, LLC.	
Non-ionic	A-90	Alligare, LLC	
Non-ionic	Alligare Surface	Alligare, LLC	
Non-ionic	Alligare Surface West	Alligare, LLC	
Non-ionic	Aqufact	Aqumix, Inc.	
Non-ionic	Brewer 90-10	Brewer International	
Non-ionic	No Foam A	Creative Marketing & Research, Inc.	
Non-ionic	Aquafact	Crop Production Services	
Non-ionic	Baron	Crown (Estes Incorporated)	
Non-ionic	Audible 80	Exacto, Inc.	
Non-ionic	Audible 90	Exacto, Inc.	
Non-ionic	N.I.S. 80	Estes Incorporated	
Non-ionic	Ad Spray 90	Helena Chemical Company	
Non-ionic	Inlet	Helena Chemical Company	
Non-ionic	Spec 90/10	Helena Chemical Company	
Non-ionic	Spret	Helena Chemical Company	
Non-ionic	Optima	Helena Chemical Company	
Non-ionic	Induce	Setre (Helena)	
Non-ionic	Induce	Helena Chemical Company	
Non-ionic	Induce pH	Helena Chemical Company	
Non-ionic	Activator 90	Loveland Products Inc.	
Non-ionic	LI-700	Loveland Products Inc.	√
Non-ionic	Scanner	Loveland Products Inc.	
Non-ionic	Spreader 90	Loveland Products Inc.	
Non-ionic	UAP Surfactant 80/20	Loveland Products Inc.	
Non-ionic	X-77	Loveland Products Inc.	
Non-ionic	Magnify	Monterey AgResources	√
Non-ionic	Range Master	ORO Agri Inc.	
Non-ionic	NIS 90:10	Precision Laboratories, LLC	
Non-ionic	Elite Platinum	Red River Specialties, Inc.	
Non-ionic	Red River 90	Red River Specialties, Inc.	
Non-ionic	Red River NIS	Red River Specialties, Inc.	
Non-ionic	Cornbelt Premier 90	Van Diest Supply Co.	
Non-ionic	Cornbelt Trophy Gold	Van Diest Supply Co.	
Non-ionic	Spray Activator 85	Van Diest Supply Co.	
Non-ionic	NIS-EA	Wilbur-Ellis	
Non-ionic	R-900	Wilbur-Ellis	
Non-ionic	Super Spread 90	Wilbur-Ellis	
Non-ionic	Super Spread 7000	Wilbur-Ellis	
Non-ionic	Agrisolutions Activate Plus	Winfield Solutions, LLC	
Non-ionic	Agrisolutions Preference	Winfield Solutions, LLC	
Spreader/Sticker	Agri-Trend Spreader	Agri-Trend	
Spreader/Sticker	TopFilm	Biosorb, Inc.	
Spreader/Sticker	Onside Kick	Exacto, Inc.	
Spreader/Sticker	Bind-It	Estes Incorporated	
Spreader/Sticker	Surf-King PLUS	Crown (Estes Incorporated)	
Spreader/Sticker	CWC 90	CWC Chemical, Inc.	
Spreader/Sticker	Cohere	Helena Chemical Company	
Spreader/Sticker	Attach	Loveland Products Inc.	
Spreader/Sticker	Bond	Loveland Products Inc.	√
Spreader/Sticker	Bond Max	Loveland Products Inc.	
Spreader/Sticker	Tactic	Loveland Products Inc.	√

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
Spreader/Sticker	Widespread Max	Loveland Products Inc.	
Spreader/Sticker	Rocket DL	Monterey AgResources	
Spreader/Sticker	Nu-Film-IR	Miller Chem. & Fert. Corp.	
Spreader/Sticker	Nu Film 17	Miller Chem. & Fert. Corp.	
Spreader/Sticker	Nu Film P	Miller Chem. & Fert. Corp.	
Spreader/Sticker	Protyx	Precision Laboratories, LLC	
Spreader/Sticker	Lastick	Setre (Helena)	
Spreader/Sticker	Insist 90	Wilbur-Ellis	
Spreader/Sticker	R-56	Wilbur-Ellis	
Spreader/Sticker	Aqua-King Plus	Winfield Solutions, LLC	
Spreader/Sticker	Surf-King Plus	Winfield Solutions, LLC	
Silicone-based	Alligare OSS/NIS	Alligare, LLC	
Silicone-based	SilEnergy	Brewer International	
Silicone-based	Silnet 200	Brewer International	
Silicone-based	Scrimmage	Exacto, Inc.	
Silicone-based	Bind-It MAX	Estes Incorporated	
Silicone-based	Thoroughbred	Estes Incorporated	
Silicone-based	Aero Dyne-Amic	Helena Chemical Company	
Silicone-based	Dyne-Amic	Helena Chemical Company	√
Silicone-based	Kinetic	Setre (Helena)	√
Silicone-based	Freeway	Loveland Products Inc.	
Silicone-based	Phase	Loveland Products Inc.	
Silicone-based	Phase II	Loveland Products Inc.	
Silicone-based	Silwet L-77	Loveland Products Inc.	
Silicone-based	Speed	Precision Laboratories, LLC	
Silicone-based	Elite Marvel	Red River Specialties, Inc.	
Silicone-based	Sun Spreader	Red River Specialties, Inc.	
Silicone-based	Syl-coat	Wilbur-Ellis	
Silicone-based	Sylgard 309	Wilbur-Ellis	
Silicone-based	Syl-Tac	Wilbur-Ellis	
Silicone-based	Thoroughbred	Winfield Solutions, LLC.	
Oil-based			
Crop Oil Concentrate	Alligare Forestry Oil	Alligare, LLC	
Crop Oil Concentrate	Brewer 83-17	Brewer International	
Crop Oil Concentrate	CWR Herbicide Activator	Creative Marketing & Research, Inc.	
Crop Oil Concentrate	Majestic	Crown (Estes Incorporated)	
Crop Oil Concentrate	Agri-Dex	Helena Chemical Company	√
Crop Oil Concentrate	Crop Oil Concentrate	Helena Chemical Company	
Crop Oil Concentrate	Power-Line Crop Oil	Land View Inc.	
Crop Oil Concentrate	Crop Oil Concentrate	Loveland Products Inc.	
Crop Oil Concentrate	Maximizer Crop Oil Conc.	Loveland Products Inc.	
Crop Oil Concentrate	Herbimax	Loveland Products Inc.	
Crop Oil Concentrate	Monterey M.S.O.	Monterey AgResources	
Crop Oil Concentrate	Exchange	Precision Laboratories, LLC	
Crop Oil Concentrate	Red River Forestry Oil	Red River Specialties, Inc.	
Crop Oil Concentrate	Red River Pacer Crop Oil	Red River Specialties, Inc.	
Crop Oil Concentrate	Cornbelt Crop Oil Concentrate	Van Diest Supply Co.	
Crop Oil Concentrate	Cornbelt Premium Crop Oil Concentrate	Van Diest Supply Co.	
Crop Oil Concentrate	R.O.C. Rigo Oil Conc.	Wilbur-Ellis	
Crop Oil Concentrate	Mor-Act	Wilbur-Ellis	
Crop Oil Concentrate	Agrisolutions Prime Oil	Winfield Solutions, LLC	
Crop Oil Concentrate	Agrisolutions Superb HC	Winfield Solutions, LLC	√
Methylated Seed Oil	Alligare MSO	Alligare, LLC	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
Methylated Seed Oil	Alligare MSO West	Alligare, LLC	
Methylated Seed Oil	MSO Concentrate	Alligare, LLC	
Methylated Seed Oil	SunEnergy	Brewer International	
Methylated Seed Oil	Sun Wet	Brewer International	
Methylated Seed Oil	Premium MSO	Helena Chemical Company	
Methylated Seed Oil	Methylated Spray Oil Conc.	Helena Chemical Company	
Methylated Seed Oil	MSO Concentrate	Loveland Products Inc.	
Methylated Seed Oil	Kixyt	Precision Laboratories, LLC.	
Methylated Seed Oil	Persist Ultra	Precision Laboratories, LLC.	
Methylated Seed Oil	Elite Supreme	Red River Specialties, Inc.	
Methylated Seed Oil	Red River Supreme	Red River Specialties, Inc.	
Methylated Seed Oil	Sunburn	Red River Specialties, Inc.	
Methylated Seed Oil	Sunset	Red River Specialties, Inc.	
Methylated Seed Oil	Cornbelt Base	Van Diest Supply Co.	
Methylated Seed Oil	Cornbelt Methylates Soy-Stik	Van Diest Supply Co.	
Methylated Seed Oil	Hasten	Wilbur-Ellis	
Methylated Seed Oil	Renegade 2.0	Wilbur-Ellis	
Methylated Seed Oil	Super Kix	Wilbur-Ellis	
Methylated Seed Oil	Super Spread MSO	Wilbur-Ellis	
Methylated Seed Oil	Agrisolutions Destiny HC	Winfield Solutions, LLC	√
Methylated Seed Oil	Atmos	Winfield Solutions, LLC	
Methylated Seed Oil + Organosilicone	Alligare MVO Plus	Alligare, LLC	
Methylated Seed Oil + Organosilicone	Inergy	Crown (Estes Incorporated)	
Methylated Seed Oil + Organosilicone	Inergy	Winfield Solutions, LLC	
Vegetable Oil	Motion	Exacto, Inc.	
Vegetable Oil	Noble	Estes Incorporated	
Vegetable Oil	Amigo	Loveland Products Inc.	
Vegetable Oil	Elite Natural	Red River Specialties	
Vegetable Oil	Competitor	Wilbur-Ellis	√
Fertilizer-based			
Nitrogen-based	Quest	Setre (Helena)	
Nitrogen-based	Quest	Helena Chemical Company	
Nitrogen-based	TransActive HC	Helena Chemical Company	
Nitrogen-based	Actamaster Spray Adjuvant	Loveland Products Inc.	
Nitrogen-based	Actamaster Soluble Spray Adjuvant	Loveland Products Inc.	
Nitrogen-based	Dispatch	Loveland Products Inc.	
Nitrogen-based	Dispatch 111	Loveland Products Inc.	
Nitrogen-based	Dispatch 2N	Loveland Products Inc.	
Nitrogen-based	Dispatch AMS	Loveland Products Inc.	
Nitrogen-based	Flame	Loveland Products Inc.	
Nitrogen-based	Cornbelt Gardian	Van Diest Supply Co.	
Nitrogen-based	Cornbelt Gardian Plus	Van Diest Supply Co.	
Nitrogen-based	Bronc	Wilbur-Ellis	
Nitrogen-based	Bronc Max	Wilbur-Ellis	√
Nitrogen-based	Bronc Max EDT	Wilbur-Ellis	
Nitrogen-based	Bronc Plus Dry	Wilbur-Ellis	
Nitrogen-based	Bronc Plus Dry EDT	Wilbur-Ellis	√
Nitrogen-based	Bronc Total	Wilbur-Ellis	
Nitrogen-based	Cayuse Plus	Wilbur-Ellis	
Nitrogen-based	Agrisolutions Alliance	Winfield Solutions, LLC	
Nitrogen-based	Agrisolutions Class Act NG	Winfield Solutions, LLC	√
Nitrogen-based	Agrisolutions Corral AMS Liquid	Winfield Solutions, LLC	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
Special Purpose or Utility			
Buffering Agent	Yardage	Exacto, Inc.	
Buffering Agent	Buffers P.S.	Helena Chemical Company	
Buffering Agent	Spray-Aide	Miller Chem. & Fert. Corp.	
Buffering Agent	Oblique	Red River Specialties, Inc.	
Buffering Agent	Brimstone	Wilbur-Ellis	
Buffering Agent	Tri-Fol	Wilbur-Ellis	
Colorants/Dyes	Hi-Light	Becker-Underwood	
Colorants/Dyes	Hi-Light WSP	Becker-Underwood	
Colorants/Dyes	Hash Mark Green Powder	Exacto, Inc.	
Colorants/Dyes	Hash Mark Green Liquid	Exacto, Inc.	
Colorants/Dyes	Hash Mark Blue Powder	Exacto, Inc.	
Colorants/Dyes	Hash Mark Blue Liquid HC	Exacto, Inc.	
Colorants/Dyes	Hash Mark Blue Liquid	Exacto, Inc.	
Colorants/Dyes	Spray Indicator XL	Helena Chemical Company	
Colorants/Dyes	Marker Dye	Loveland Products Inc.	
Colorants/Dyes	TurfTrax	Loveland Products Inc.	
Colorants/Dyes	TurfTrax Blue Spray Indicator	Loveland Products Inc.	
Colorants/Dyes	BullsEye	Milliken Chemical	
Colorants/Dyes	Mark-It Blue	Monterey AgResources	
Colorants/Dyes	Mark-It Red	Monterey AgResources	
Colorants/Dyes	Signal	Precision	
Colorants/Dyes	SPI-Max Blue Spray Marker	PROKoZ	
Colorants/Dyes	Elite Splendor	Red River Specialties, Inc.	
Colorants/Dyes	Mystic HC	Winfield Solutions, LLC	
Compatibility/Suspension Agent	E Z MIX	Loveland Products Inc.	
Compatibility/Suspension Agent	Support	Loveland Products Inc.	
Compatibility/Suspension Agent	Convert	Precision Laboratories, LLC	
Compatibility/Suspension Agent	Blendex VHC	Setre (Helena)	
Deposition Aid	Alligare Pattern	Alligare, LLC	
Deposition Aid	Cygnet Plus	Brewer International	√
Deposition Aid	Poly Control 2	Brewer International	
Deposition Aid	CWC Sharpshooter	CWC Chemical, Inc.	
Deposition Aid	Offside	Exacto, Inc.	
Deposition Aid	Clasp	Helena Chemical Company	
Deposition Aid	Grounded	Helena Chemical Company	
Deposition Aid	Grounded - CA	Helena Chemical Company	
Deposition Aid	ProMate Impel	Helena Chemical Company	
Deposition Aid	Pointblank	Helena Chemical Company	
Deposition Aid	Strike Zone DF	Helena Chemical Company	
Deposition Aid	Compadre	Loveland Products Inc.	
Deposition Aid	Intac Plus	Loveland Products Inc.	
Deposition Aid	Liberate	Loveland Products Inc.	√
Deposition Aid	Reign	Loveland Products Inc.	
Deposition Aid	Reign LC	Loveland Products Inc.	
Deposition Aid	Weather Gard	Loveland Products Inc.	
Deposition Aid	Mist-Control	Miller Chem. & Fert. Corp.	
Deposition Aid	Sustain	Miller Chem. & Fert. Corp.	
Deposition Aid	Exit	Miller Chem. & Fert. Corp.	
Deposition Aid	Border AQ	Precision Laboratories, LLC	
Deposition Aid	Direct	Precision Laboratories, LLC	
Deposition Aid	Volare DC	Precision Laboratories, LLC	
Deposition Aid	Elite Secure Ultra	Red River Specialties, Inc.	
Deposition Aid	Secure Ultra	Red River Specialties, Inc.	
Deposition Aid	Sta Put	Setre (Helena)	

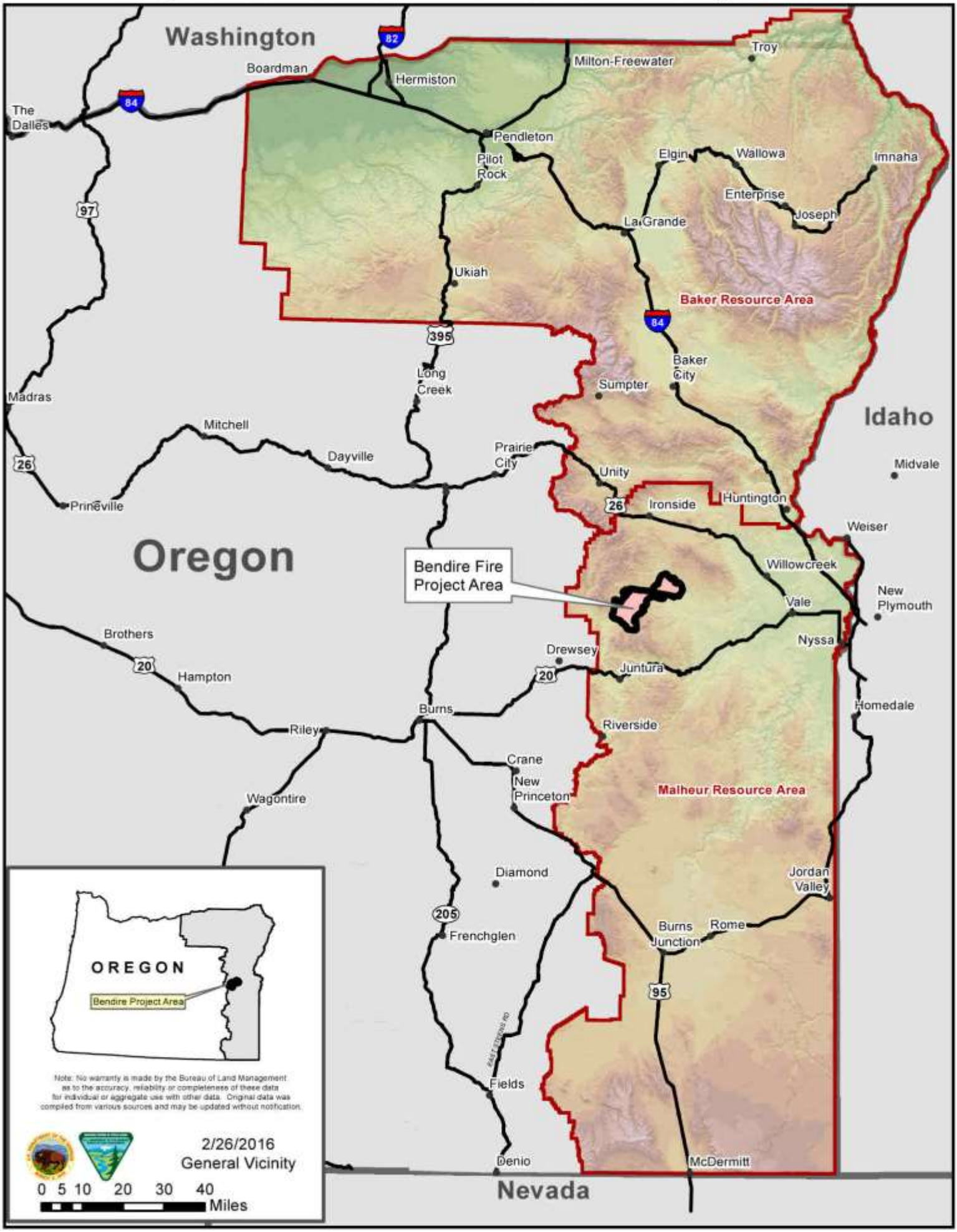
Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
Deposition Aid	Agripharm Drift Control	Walco International	
Deposition Aid	Bivert	Wilbur-Ellis	
Deposition Aid	Coverage G-20	Wilbur-Ellis	
Deposition Aid	Crosshair	Wilbur-Ellis	
Deposition Aid	EDT Concentrate	Wilbur-Ellis	
Deposition Aid	Droplex	Winfield Solution, LLC.	
Deposition Aid	Agrisolutions Interlock	Winfield Solutions, LLC	√
Defoaming Agent	Fast Break	Agrisolutions	
Defoaming Agent	Alligare Anti-Foamer	Alligare, LLC	
Defoaming Agent	Defoamer	Brewer International	
Defoaming Agent	Tripleline	Creative Marketing & Research, Inc.	
Defoaming Agent	Reverse	Exacto, Inc.	
Defoaming Agent	Foambuster Max	Helena Chemical Company	
Defoaming Agent	Fighter-F 10	Loveland Products Inc.	
Defoaming Agent	Fighter-F Dry	Loveland Products Inc.	
Defoaming Agent	Unfoamer	Loveland Products Inc.	
Defoaming Agent	Foam Fighter	Miller Chem. & Fert. Corp.	
Defoaming Agent	Gundown Max	Precision Laboratories, LLC	
Defoaming Agent	Red River Defoamer	Red River Specialties, Inc.	
Defoaming Agent	Foam Buster	Setre (Helena)	
Defoaming Agent	Cornbelt Defoamer	Van Diest Supply Co	
Defoaming Agent	FTF Defoamer	Wilbur-Ellis	
Defoaming Agent	No Foam	Wilbur-Ellis	
Diluent/Deposition Agent	Improved JLB Oil Plus	Brewer International	
Diluent/Deposition Agent	JLB Oil Plus	Brewer International	
Diluent/Deposition Agent	Bark Oil EC	Crop Production Services	
Diluent/Deposition Agent	Bark Oil	Crop Production Services	
Diluent/Deposition Agent	Hy-Grade I	CWC Chemical, Inc	
Diluent/Deposition Agent	Hy-Grade EC	CWC Chemical, Inc	
Diluent/Deposition Agent	Elite Premier	Red River Specialties, Inc.	
Diluent/Deposition Agent	Elite Premier Blue	Red River Specialties, Inc.	
Diluent/Deposition Agent	Red River Basal Oil	Red River Specialties, Inc.	
Diluent/Deposition Agent	Thinvert TRU	Waldrum Specialties, Inc.	
Diluent/Deposition Agent	Thinvert Concentrate	Waldrum Specialties, Inc.	
Diluent/Deposition Agent	In-Place	Wilbur-Ellis	
Diluent/Deposition Agent	W.E.B. Oil	Wilbur-Ellis	
Foam Marker	Align	Helena Chemical Company	
Foam Marker	Tuff Trax Foam Concentrate	Loveland Products, Inc.	
Foam Marker	Trekker Trax	Loveland Products, Inc.	
Foam Marker	Red River Foam Marker	Red River Specialties, Inc.	
Foam Marker	R-160	Wilbur-Ellis	
Invert Emulsion Agent	Redi-vert II	Wilbur-Ellis	
Tank Cleaner	Wipe Out	Helena Chemical Company	
Tank Cleaner	All Clear	Loveland Products Inc.	
Tank Cleaner	Back Field	Exacto, Inc.	
Tank Cleaner	Tank and Equipment Cleaner	Loveland Products Inc.	
Tank Cleaner	Red River Tank Cleaner	Red River Specialties, Inc.	
Tank Cleaner	Elite Vigor	Red River Specialties, Inc.	
Tank Cleaner	Kutter	Wilbur-Ellis	
Tank Cleaner	Neutral-Clean	Wilbur-Ellis	
Tank Cleaner	Cornbelt Tank-Aid	Van Diest Supply Co.	
Water Conditioning	Alligare Water Conditioner	Alligare, LLC	
Water Conditioning	Rush	Crown (Estes Incorporated)	
Water Conditioning	Completion	Exacto, Inc.	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
Water Conditioning	AccuQuest WM	Helena Chemical Company	
Water Conditioning	Hel-Fire	Helena Chemical Company	
Water Conditioning	Smoke	Helena Chemical Company	
Water Conditioning	Blendmaster	Loveland Products Inc.	
Water Conditioning	Choice	Loveland Products Inc.	
Water Conditioning	Choice Xtra	Loveland Products Inc.	
Water Conditioning	Choice Weather Master	Loveland Products Inc.	
Water Conditioning	Import	Precision Laboratories, LLC	
Water Conditioning	Transport LpH	Precision Laboratories, LLC	
Water Conditioning	Transport Plus	Precision Laboratories, LLC	
Water Conditioning	Elite Imperial	Red River Specialties, Inc.	
Water Conditioning	Cornbelt N-Tense	Van Diest Supply Co.	
Water Conditioning	Climb	Wilbur-Ellis	
Water Conditioning	Cut-Rate	Wilbur-Ellis	√

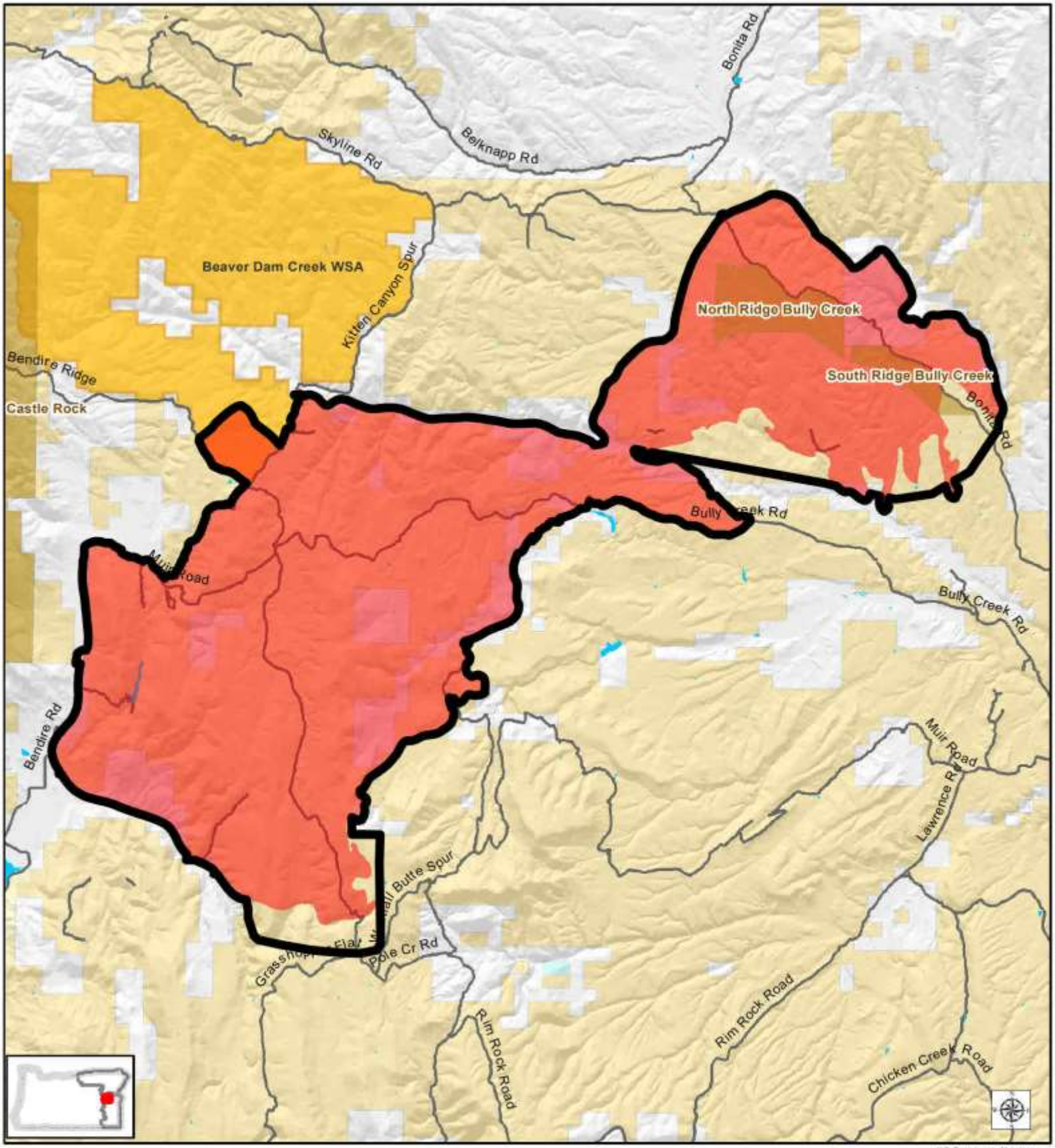
1. Updated May 14, 2014.
2. Approved for use near water under ARBO II

APPENDIX D: MAPS

Map 1: Bendire Fire ESR Invasive Plant Management EA



Bendire Fire ESR Invasive Plant Management EA
Map 2: Land Status (with ACEC and WSA)



Legend

- Bendire Project Area
- Bendire Fire
- Areas of Critical Environmental Concern
- Wilderness Study Area
- BLM/County Roads
- WaterBodies
- Bureau of Land Management
- Bureau of Reclamation
- Private

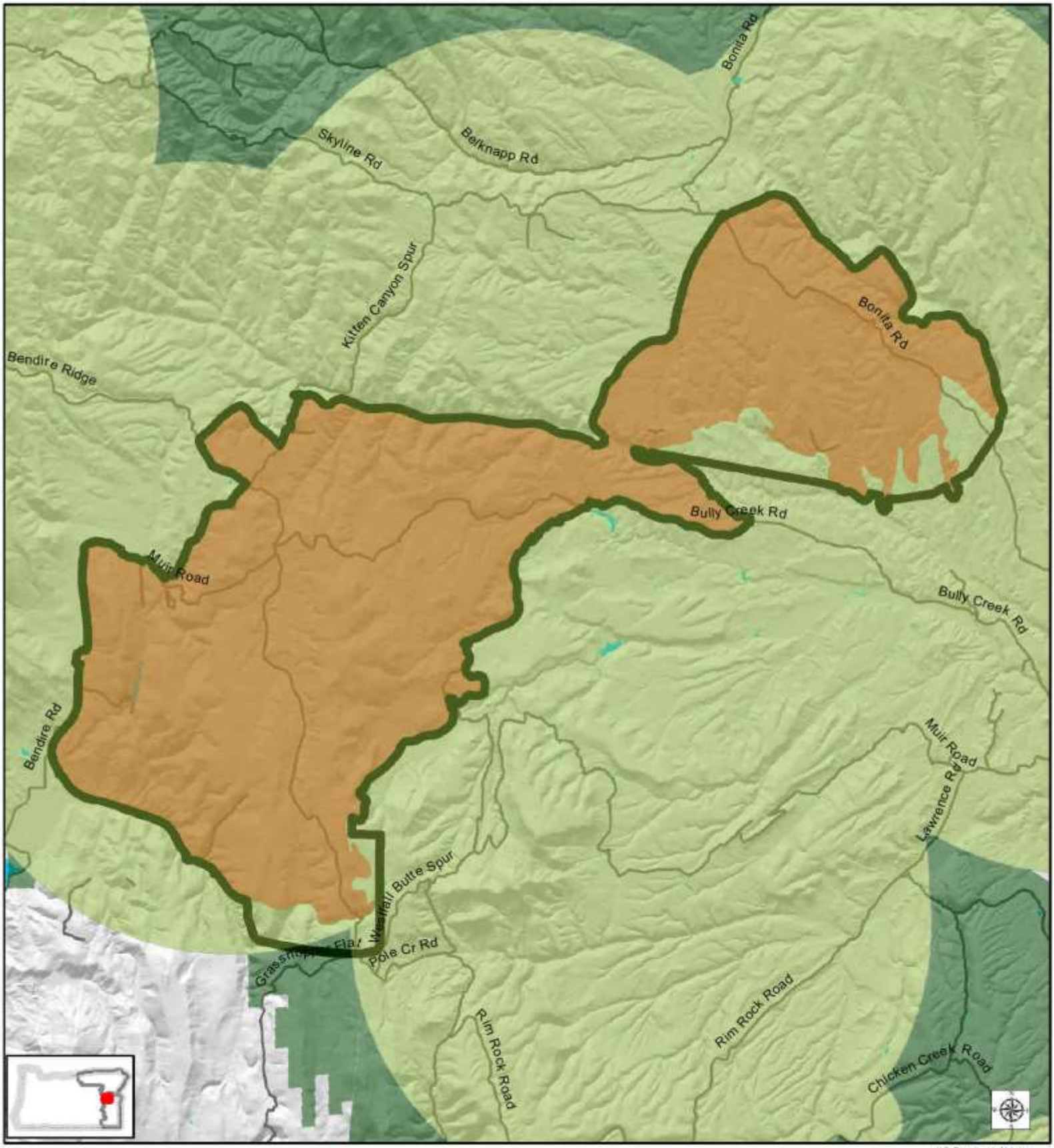
0 1.75 3.5 Miles

0 1,875 3,750 7,500 Meters

U.S. Department of Interior
Bureau of Land Management

Vale District
2/28/2018

Bendire Fire ESR Invasive Plant Management EA
Map 3: Sage Grouse Habitat (PHMA & GHMA)



Legend

- General Habitat Managment Area (GHMA)
- Priority Habitat Management Area (PHMA)
- **Bendire Project Area**
- **Bendire Fire**
- **WaterBodies**
- **BLM/County Roads**

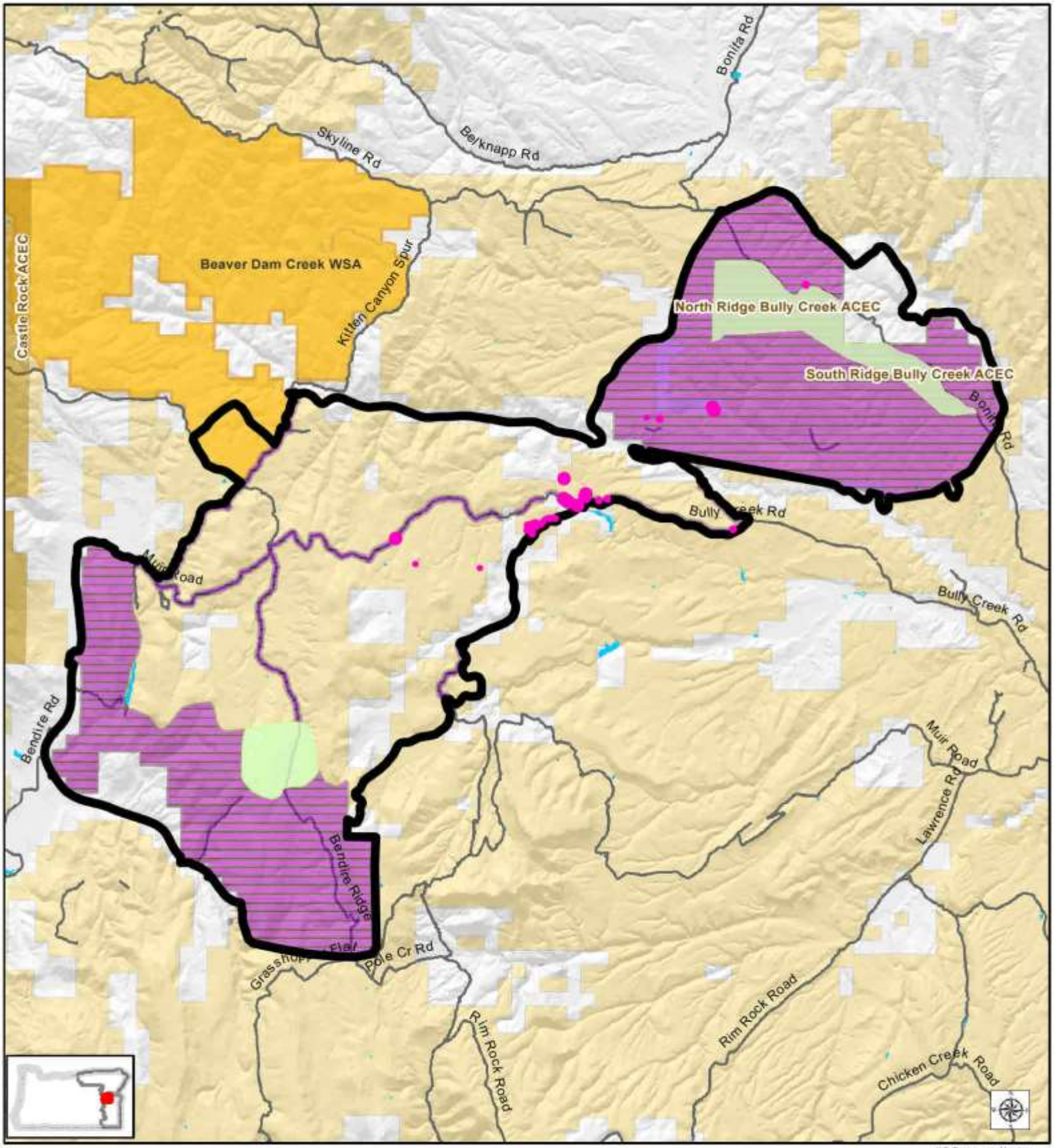
0 1.75 3.5 Miles

0 1,875 3,750 7,500 Meters

U.S. Department of Interior
Bureau of Land Management

Vale District
2/20/2018

Bendire Fire ESR Invasive Plant Management EA
Map 4: Treatment Areas



Legend

- Identified Weed Sites
- Completed Imazapic Treatment
- Proposed Imazapic Treatment Area
- Bendire Project Area
- Areas of Critical Environmental Concern
- WaterBodies
- BLM/County Roads
- Wilderness Study Area
- Bureau of Land Management
- Bureau of Reclamation
- Private

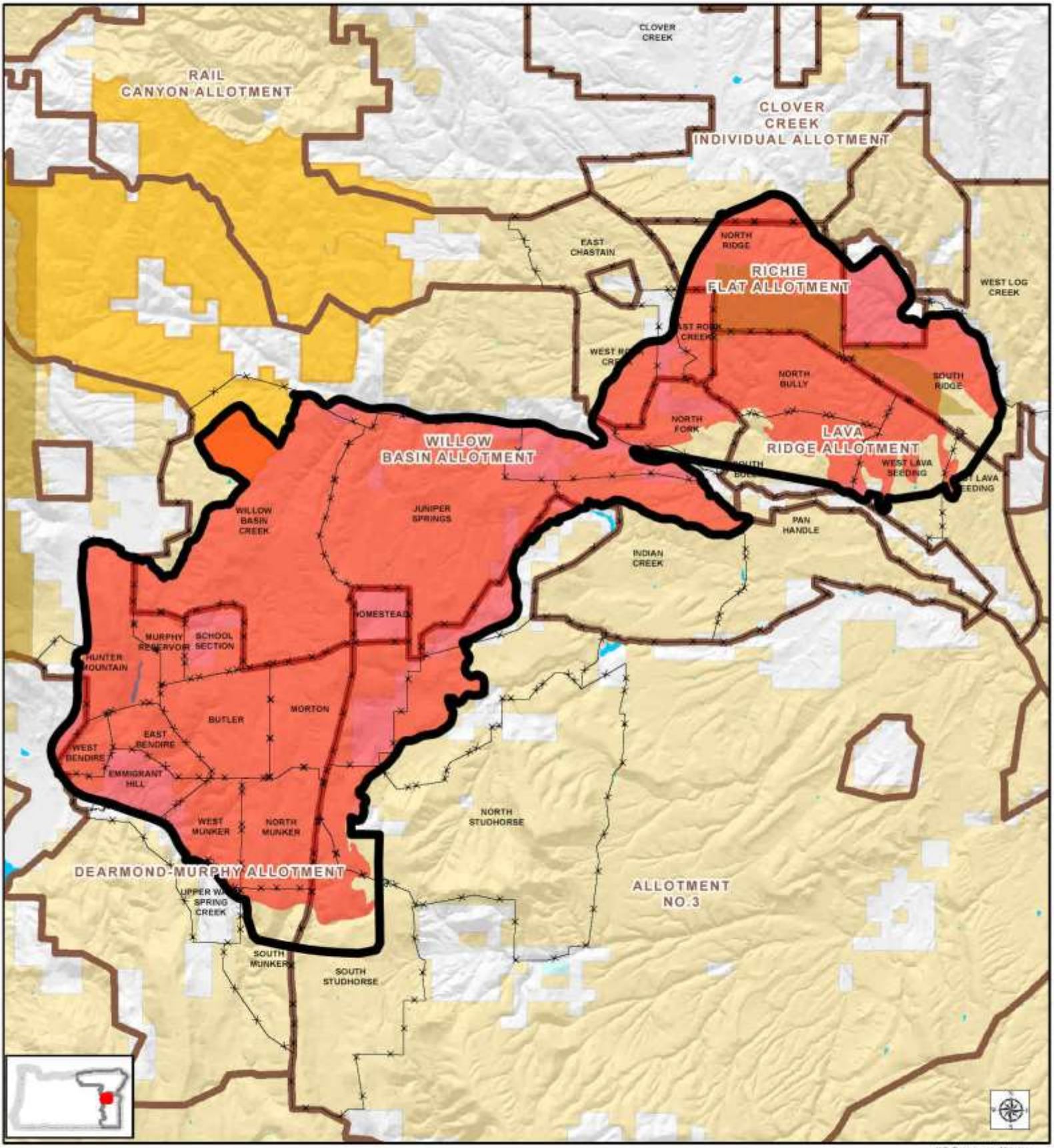
0 1.5 3 Miles

0 1,850 3,700 7,400 Meters

U.S. Department of Interior
Bureau of Land Management

Vale District
2/20/2018

Bendire Fire ES&R EA
Map 5: Allotments and Pastures



Legend

- Bendire Project Area
- Bendire Fire
- Pastures
- Allotment
- Areas of Critical Environmental Concern
- WaterBodies
- Wilderness Study Area
- Bureau of Land Management
- Bureau of Reclamation
- Private

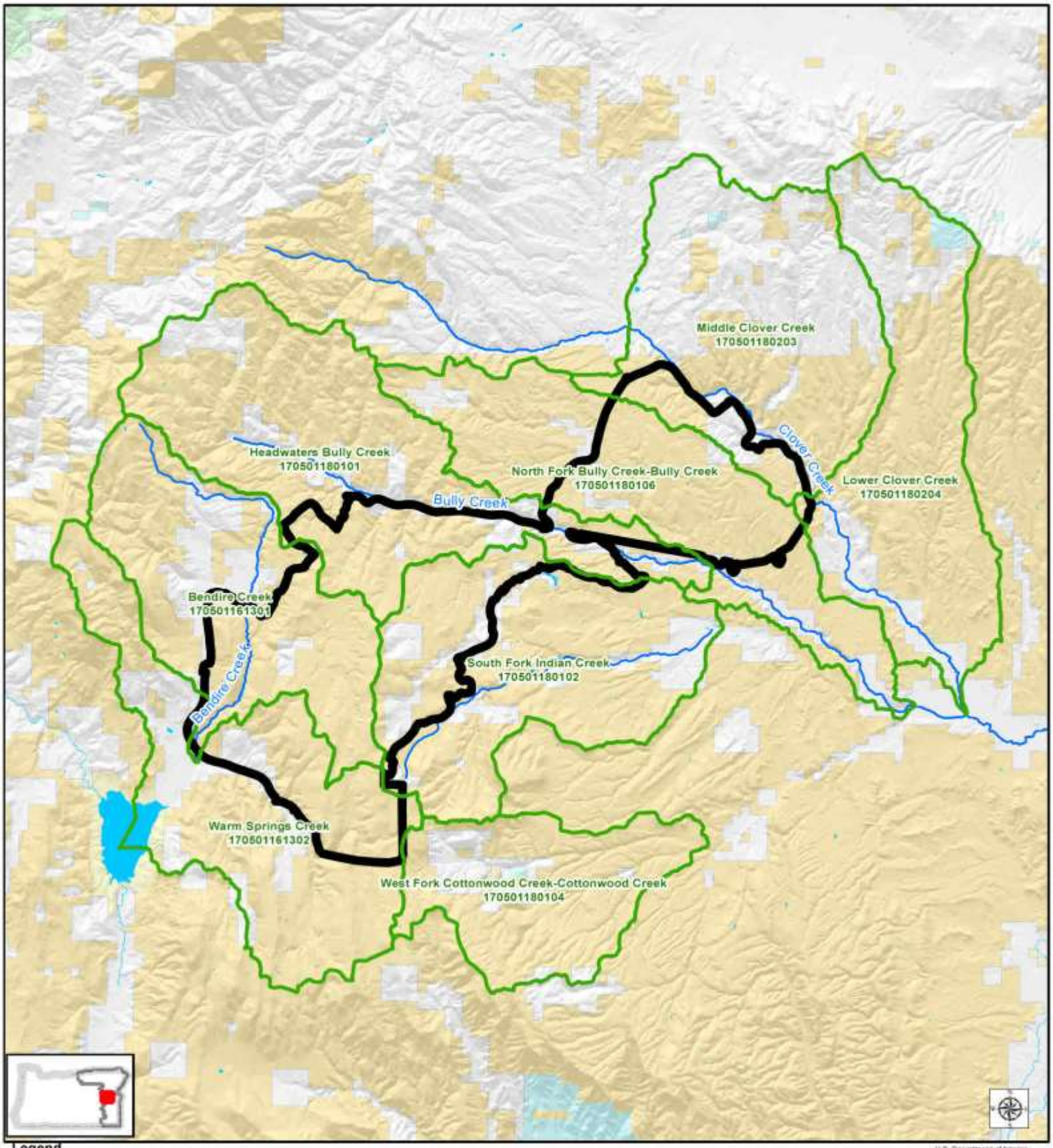
0 1.75 3.5 Miles

0 1,875 3,750 7,500 Meters

U.S. Department of Interior
Bureau of Land Management

Vale District
3/2/2016

Bendire Fire ESR Invasive Plant Management EA
Map 6: Subwatersheds (HUC 12)



Legend

- Subwatersheds (HUC 12)
- 303d Listed Streams
- Bendire Project Area
- WaterBodies
- Bureau of Land Management
- Bureau of Reclamation
- Other Federal
- Private

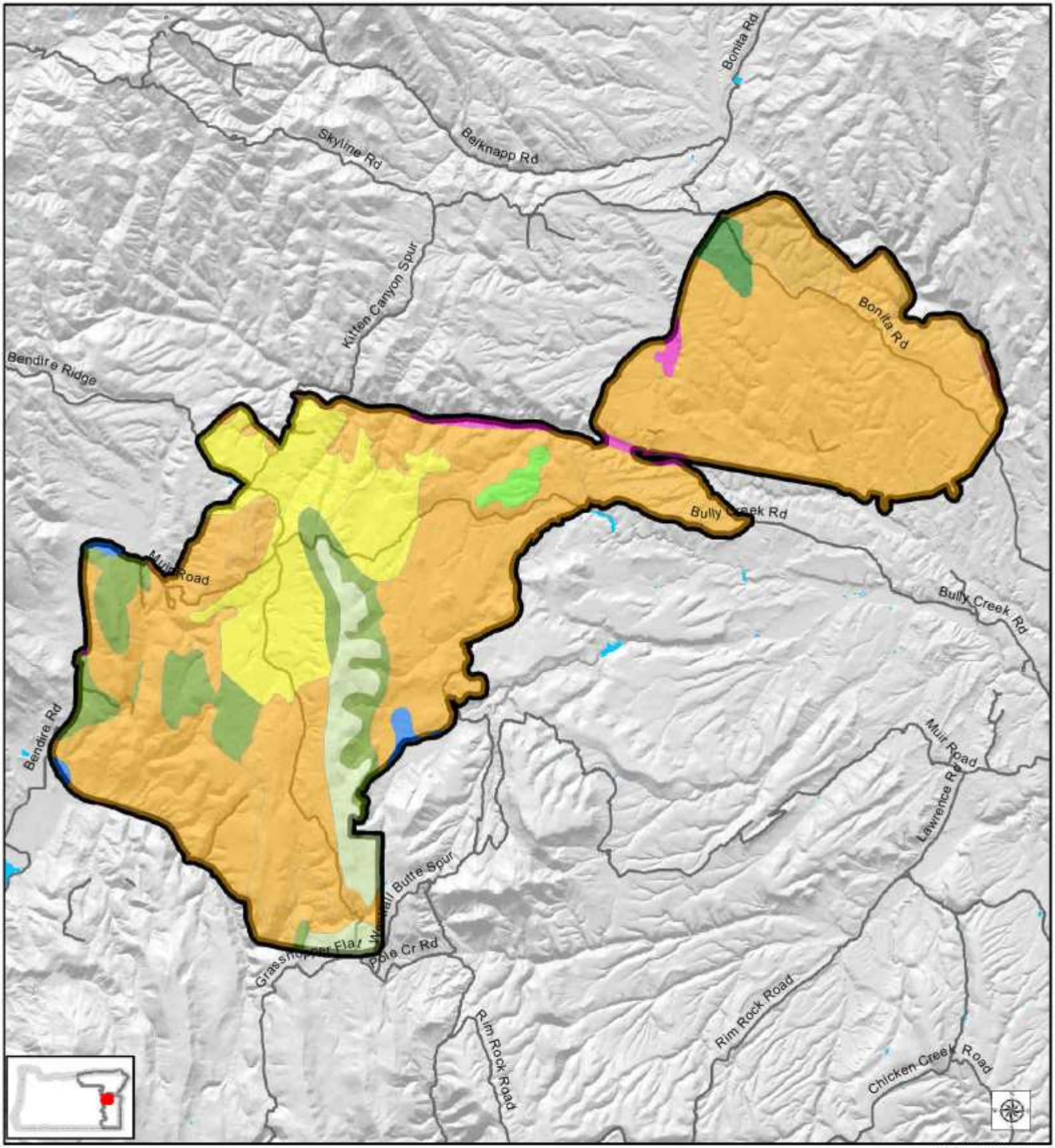
0 2.75 5.5 Miles

0 2,850 5,700 11,400 Meters

U.S. Department of Interior
Bureau of Land Management

Vale District
2/20/2015

Bendire Fire ESR Invasive Plant Management EA
Map 7: Soils



Legend

Soils: 1, 56, 60, 75, 76, 83, 84, Br, Ru, Vi

Bendire Project Area

WaterBodies

BLM/County Roads

0 1.75 3.5 Miles

0 1,875 3,750 7,500 Meters

U.S. Department of Interior
Bureau of Land Management

Vale District
2/28/2018