Integrated Invasive Plant Management For the Burns District Environmental Assessment

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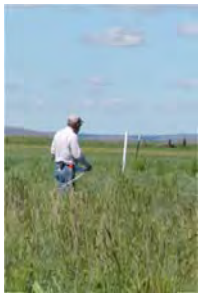

U.S. Department of the Interior
Bureau of Land Management

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Acronyms and Abbreviations

ACEC	Areas of Critical Environmental Concern
ALS	Acetolactate synthase
AMP	Allotment Management Plans
APHIS	Animal and Plant Health Inspection Service
ARBO	Aquatic Restoration Biological Opinion
ATV	All-Terrain Vehicle
AUM	Animal Unit Months
BEE	With triclopyr, butoxyethyl ester
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
CMPA	(Steens Mountain) Cooperative Management and Protection Area
CWMA	Cooperative Weed Management Area
DNA	Documentation of NEPA Adequacy
EA	Environmental Assessment
EDRR	Early Detection / Rapid Response
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESI	Ecological Site Inventory
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
GLEAMS	Groundwater Loading Effects of Agricultural Management Systems
HMA	Herd Management Area
K_{oc}	Soil Adsorption Value
LD_{50}	Lethal Dose to 50% of a population
MM	Mitigation Measure
MRDG	Minimum Requirements Decisions Guide
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
Oregon FEIS	Vegetation Treatments Using Herbicides on BLM Lands in Oregon FEIS (2010)
OSU	Oregon State University
PEIS	Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic FEIS (2010)
PFC	Proper Functioning Condition
PGMA	Preliminary General Management Areas
pH	potential of Hydrogen (measure of acidity)
POEA	Polyoxyethylenamine, a surfactant found in some glyphosate formulations
PPMA	Preliminary Priority Management Areas
RMP	Resource Management Plan
RNA	Research Natural Area
ROW	Right-of-Way
SWAT	Strategic Weed Attack Team
TEA	With triclopyr, triethylamine salt
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
WSA	Wilderness Study Area

Photos on cover provided by Lesley Richman, Burns District Weed Coordinator

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Chapter 1 – Purpose and Need

Introduction

The Burns District manages approximately 3.276 million acres of public lands located primarily in Harney County, in southeast Oregon (see Map 1-1 at the end of this Chapter). The district is proposing to expand and update its existing integrated noxious weed management program. The district currently controls noxious weeds under a district-wide 1998 Noxious Weed Management Environmental Assessment that analyzes treatments using a range of methods including manual, mechanical, biological controls (mostly insects), targeted grazing,[1] prescribed fire, and herbicides (2,4-D, dicamba, glyphosate, and picloram)[2]. The district proposes to expand this program by:

- Increasing the kinds of plants controlled from noxious weeds to all invasive plants; and,
- Increasing the number of herbicides to be used district-wide from four to 14.

Invasive plants are non-native aggressive plants with the potential to cause significant damage to native ecosystems and / or cause significant economic losses.

Noxious weeds are a subset of invasive plants that are county-, State-, or Federally-listed as injurious to public health, agriculture, recreation, wildlife, or any public or private property.

Thus, the term "invasive plants" includes noxious weeds in this EA (Oregon FEIS – USDI 2010a).

Invasive annual grasses like cheatgrass (that are not designated as noxious) are causing widespread ecological damage including damage to habitats for Special Status species such as Greater sage-grouse. The additional herbicides are generally newer, more selective, provide better control, have fewer adverse environmental effects, are effective at lower doses, are better suited for controlling an increasing number of species of invasive plants and for managing the potential for herbicide resistance, and can be used to make associated non-herbicide methods (including targeted grazing) more available and more effective (USDI 2010b:19-25).

The additional herbicides, and their use on all invasive plants, were addressed in the 2010 Final Environmental Impact Statement (Oregon FEIS) and Record of Decision for *Vegetation Treatments Using Herbicides on BLM Lands in Oregon* (USDI 2010a). A 1984 / 87 court injunction had limited the BLM to using only four herbicides (2,4-D, dicamba, glyphosate, and picloram) and restricting their use to noxious weeds only (USDI 2010a:3). This injunction was amended following completion of the 2010 Oregon FEIS and Record of Decision to permit the use of additional herbicides and targeting additional species once site-specific EAs were completed, tiered to the Oregon FEIS, a similar 2007 western states EIS (USDI 2007a), or subsequent BLM environmental analysis at the national or State level.

This Environmental Assessment (EA) examines the environmental effects of the proposal at a site-specific scale within the district. It will replace the 1998 *Noxious Weed Management Program Environmental Assessment* for the Burns District.

The Need

Twenty-five species of invasive plants now occupy over 26,000 acres in nearly 7,000 separate documented locations. The invasive annual grasses medusahead rye (*Taeniatherum caput-medusae*), cheatgrass *(Bromus tectorum)*, and North Africa grass or ventenata (*Ventenata dubia*) are estimated to infest an additional 850,000,

[1] Targeted grazing may be described in other documents as directed livestock, prescribed grazing, and others.
[2] Additional herbicides have been authorized for seven specific project areas. See *The No Action Alternative* introduction in Chapter 2.

acres.[3] The district treats 3,000 to 19,000 acres of noxious weeds and other invasive plants each year using herbicide and non-herbicide methods such as manual, mechanical, targeted grazing, and biological (insects) control (see Table 2-8 in Chapter 2). In spite of ongoing control efforts, invasive plants are continuing to spread at an estimated rate of 12 percent per year (USDI 2010a:133).[4] All lands are susceptible to a range of invasive plants. 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 2010a:7).

For some invasive plant species such as Canada thistle (*Cirsium arvense*), perennial pepperweed (*Lepidium latifolium*), whitetop (*Cardaria draba*), and medusahead rye, neither non-herbicide methods nor the four herbicides currently utilized result in effective control (USDI 2010a:6, 588, 618-19). The existing program also does not have effective methods to control other invasive annual grasses such as cheatgrass or North Africa grass (*Ventenata dubia*) that are primary invaders following wildfires. Without effective controls, these invasive annual grass infestations continue to increase in size and density, displacing native vegetation, preventing wildfire rehabilitation, degrading Greater sage-grouse habitat, and increasing the risk of wildland fire.

There are newer, more selective herbicides 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 2010a: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 2010a: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 those coordinated by the Harney County Cooperative Weed Management Area Partnership (CWMA). 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.

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)).

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

The Purposes

The district proposes to expand the existing noxious weed management program so it would more effectively:

- Control invasive plants to protect native ecosystems and the flora and fauna that depend on them.
- Manage invasive plants to reduce the risk that large-scale high-intensity fires would unacceptably damage resources and human developments.
- 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.

[3] See Table 2-1, *Summary of Documented Invasive Plant Sites* and Table 2-5, *Invasive Annual Grasses*.
[4] See also the rate of spread discussion in the *Invasive Plants* section early in Chapter 3.

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

Each of these purposes is addressed by one or more of the issue statements listed below and are used to guide the effects analysis in Chapter 3. Additional background information for each of these purposes can be found in the Oregon FEIS (USDI 2010a:9-12).

Scoping

External scoping for the EA was initiated July 15, 2011 and ran through August 15, 2011. In addition to a news release in the Burns Times Herald newspaper, scoping letters were sent to 1,263 individuals, groups, and agencies. Potentially affected tribes were also contacted with a request to enter into government-to-government consultation and be involved with the project. Twelve reply letters, emails, or phone calls were received. These letters, along with other pertinent information, were used to help develop the *Purposes* and *Issues*. (Internal BLM scoping and the Purposes examined in the Oregon FEIS also contributed to the *Purposes*.)

Issues

Issues are analyzed when:

- analysis is necessary for making a reasoned choice from among the alternatives (e.g., is there a measureable difference between the alternatives with respect to the issue);
- the issue identifies a potentially significant environmental effect; or,
- public interest or a law / regulation dictates that effects should be displayed.

A variety of issues were identified during internal (BLM) and external (public) scoping. Those meeting the criteria described above have been framed as questions and are listed below. These issues are used to guide the effects analysis in Chapter 3.

Issues for Analysis

Invasive Plants

- How would the alternatives reduce the spread of noxious weeds and other invasive plants?
- How would the alternatives respond to a tendency for some populations of invasive plants to develop resistance to an herbicide?
- How would the alternatives affect the introduction of invasive plants where prescribed fire has been used as a resource management tool?
- How would the alternatives affect BLM's cooperators who have an invasive plant control program?

Native Vegetation

- How would the alternatives affect native plant communities?

Special Status Plants

- How would the alternatives affect Special Status plants?

Soil Resources

- How would the alternatives affect biological soil crusts?
- Are there soils / conditions where particular herbicides included in the alternatives could be transported off site?
- What are the effects of herbicides on soil function?

Water Resources

- How would the alternatives affect surface water quality including sediment, temperature, dissolved oxygen, and chemical contamination?
- How would the alternatives affect the safety of drinking, irrigation, or stock water?
- How would the alternatives affect bioaccumulation of herbicides in hydrologic systems including groundwater and streams?
- How would the alternatives affect stream channel stability and structural complexity?

Riparian and Wetlands

- How would the alternatives affect the health and function of riparian and wetland areas?
- How would the alternatives affect riparian / wetland vegetation?

Fish, Special Status Species (Aquatic), and Other Aquatic Resources

- How would the alternatives affect fish, amphibians, (including Special Status species) and their habitat, including water quality, macroinvertebrates, aquatic and riparian vegetation, and habitat complexity?

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

- How would large-area treatments affect smaller resident species including insects, mammals, and reptiles?
- How would the alternatives affect locally important species such as mule deer, elk, pronghorn antelope, and bighorn sheep?
- How would the alternatives affect Special Status wildlife species including Greater sage-grouse?
- How would treatment disturbances (noise, presence of humans) and the timing of that disturbance affect migratory bird nesting and migration?
- How would the alternatives affect habitat quality (forage and cover availability / quality / quantity) over the short or long term?

Livestock Grazing

- How would herbicide treatments affect livestock grazing on BLM allotments?
- How would the use of herbicides affect livestock and their forage?

Fire and Fuels Management

- How would the alternatives affect wildfire frequency and intensity?

Native American Resources and Uses

- How would the alternatives affect culturally significant plant species used for Native American subsistence, religious or ceremonial purposes?
- How would the alternatives affect health and safety of Native American people who gather, handle, or ingest plants from in or near treatment areas?
- How would the alternatives affect cultural resources?

Recreation

- How would alternatives affect the recreating public?
- How would the alternatives affect access to recreation sites?
- How would the alternatives affect pets?

Special Management Areas[5]

- How would the alternatives affect Special Management Areas?
- How would landing aircraft for invasive plant management support affect wilderness characteristics?

Lands and Realty

- How would the alternatives affect rights-of-way and administrative site grants and leases?

Socioeconomics

- How would the alternatives affect adjacent agricultural activities, including organic farms or permittees certified organic?
- How would alternatives affect adjacent landowners?

Implementation Costs

- How would the alternatives affect the cost of invasive plant control?

Human Health and Safety

- What is the risk from possible exposure of the public to herbicides for each alternative?
- How would the alternatives affect worker safety?
- How would the use of helicopters for transporting affect worker safety?

Issues Considered but not Analyzed in Detail

Several issues identified during internal and external scoping were considered but not analyzed in detail in this EA. In general, these issues have already been addressed in documents to which this EA tiers and a) there is not enough difference between the alternatives relative to the issue for an analysis to aid the decision-maker; and, b) because of required project design features (see Appendix A, *Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*), there is negligible

[5] Special Congressionally or Resource Management Plan-designated areas including Areas of Critical Environmental Concern, Research Natural Areas, Wild and Scenic Rivers, Wilderness and Wilderness Study Areas, special recreation areas, and so forth.

likelihood that detailed analysis of these issues would reveal a potentially significant effect to the environment which hasn't already been disclosed in the documents to which this EA tiers.

These issues, and the reason(s) for not addressing them in the EA, are as follows:

Treatment Methods and Monitoring

- How will the BLM monitor the effects of herbicides on vegetation, water, soil, and other resources?

This issue was not analyzed in detail because the Oregon FEIS, Appendix 3, describes BLM-required monitoring when toxic materials are introduced near sensitive areas such as residences or domestic water supplies. Suggested monitoring points include air, vegetation, soil, and water (USDI 2010a:474-5). The Oregon Record of Decision goes on to require at least three years of monitoring at the Oregon-wide level for FEIS-identified environmental concerns, and lists several examples where resource concerns or herbicide applications would trigger monitoring consideration (USDI 2010b:16). The Oregon Record of Decision also requires drift monitoring of all aerial application of ALS-inhibitors conceivably affecting private lands or Special Status species (see *Background-Invasive Plant Management*, Monitoring in Chapter 2 of this EA).

- How can the EA ensure alternatives to herbicides are used first, herbicides are used only where absolutely necessary, and use is limited and decreases in the future?

This issue was not analyzed in detail because existing Department of the Interior policy, applicable to all alternatives, states that, "Bureaus will accomplish pest management through cost-effective means that pose the least risk to humans, natural and cultural resources, and the environment" and requires bureaus to "[e]stablish site management objectives and then choose the lowest risk, most effective approach that is feasible for each pest management project" (USDI 2007c), and "Determine, for each target pest, the possible courses of action and evaluate relative merits for controlling the pest with the least adverse effects on the environment" (Chemical Pest Control Handbook, BLM Manual 9011 - USDI 1992a)(USDI 2010a:68). By definition, invasive plants are difficult to control and herbicide applications may be necessary to prevent undue degradation and promote land health.

Given the continued spread of invasive plants and an increasing emphasis on protecting threatened habitats, it is unlikely the need for effective invasive plant control would decrease in the foreseeable future (USDI 2010a:139).

Air Quality

- How would the alternatives affect air quality?

This issue was not analyzed in detail because the effects of herbicides to air quality is addressed in the Oregon FEIS, and would not change in Burns.

The Proposed Action envisions very little burning as an invasive plant treatment, on the order of one or two projects per decade. Any such burning would be designed to comply with the objectives of the Oregon Smoke Management Plan for forest management burning, including the protection of Class 1 visibility areas like 1964-designated Wilderness Areas. Most management activities included in the Proposed Action would be relatively benign to air quality, or would reduce the likelihood of wildfire thereby slowing or preventing the degradation of air quality that would result from having natural fire intervals shortened by invasive annual grasses.

Wildlife

- How would the alternatives affect lynx and wolves on the district?

This issue was not analyzed in detail because although lynx and wolves have been known to pass through the district, there is marginal habitat and they are assumed an occasional visitor to the area. Invasive plant control treatments are not expected to disturb or affect these species other than to protect or restore native vegetation contributing to their habitats.

Wild Horses and Burros

- How would consumption of herbicide-treated vegetation effect wild horses and burros?
- How would herbicide treatment activities affect wild horses and burros?

The herbicide portion of the Proposed Action is analyzed in the Oregon FEIS (USDI 2010a:268-273). The Proposed Action would be expected to improve (or at least slow the decline of) the amount and quality of forage available, potentially increasing the carrying capacity of the Herd Management Areas (HMAs) and reducing other resource concerns (USDI 2010a:268). The effects to habitat conditions under both alternatives are analyzed in the *Native Vegetation* section of this EA and would apply to wild horse and burro habitat conditions. A number of standard operating procedures and mitigation measures (see Appendix A) are in place to minimize potential risks, if they arise, to wild horses and burros from specific chemicals or application rates. The analysis of effects of consumption of treated vegetation was based upon the BLM and Forest Service Herbicide Risk Assessments (see Appendix C). Based on these risk assessments, the Oregon FEIS concluded that reaching Ecological Risk Assessment-identified risk levels would be unlikely unless the animal forages exclusively within the treatment area for an entire day (USDI 2010a:269). The HMAs in the Burns District range from 26,874 acres to 474,501 acres in size. Ninety-eight percent of herbicide treatments on invasive plants other than invasive annual grasses on the Burns District are on sites that are less than 20 acres in size (see Table 3-4. *Summary of Invasive Plants by Infestation Size*). Hence, the likelihood of a wild horse or burro eating herbicide treated vegetation, other than invasive annual grasses, for an entire day is unlikely. Under the Proposed Action large scale treatments would be implemented on Burns District to reduce the dominance of invasive annual grasses. The herbicide treatment work in these areas involves broadcast spraying (ground or aerially) with imazapic. As analyzed in the Oregon FEIS, imazapic presents no identified risk to wild horses and burros (USDI 2010a:273).

Herbicide treatment activities would be short term (one day to one week) within specific areas of HMA boundaries. Most of the wild horse herds in Burns District are accustomed to human interaction in their use areas (e.g. Steens Mountain Loop Road in South Steens HMA, Kiger Mustang Viewing Road / Area in Kiger HMA, Double O Road (County road) through Palomino Buttes HMA). Horses and burros often leave the area where activity is taking place then return to the area once activity subsides, even with aerial herbicide application. To further minimize effects to wild horses during treatment activities additional Project Design Features have been included in the Proposed Action.

Archeological Resources

- How would the alternatives, in particular ones that include ground disturbing vegetation management (such as hand grubbing invasive plants and cross county all-terrain vehicle (ATV) travel associated with remote spraying projects), affect historic and prehistoric sites?

Archaeological site integrity, the data potential of sites, is dependent upon the placement of artifacts in a horizontal and vertical plane from their initial deposition to eventual discovery. Any force that compromises this integrity contributes to the loss of meaningful data at a site. When data is lost, that portion of the effected site generally cannot be eligible for nomination to the National Register of Historic Places, the primary “yard stick” for

managing archaeological sites. Mitigation measures for protecting the surface and the shallow depths of such sites are not required when a site is considered ineligible.

Seventy percent of known surface archaeological sites on Burns District (approximately 2,100 sites) have been affected by physical forces such as sediment swelling, drying and cracking (particularly in clay rich sediments), which can move cultural materials from the surface to a depth of 6" and back to the surface in soils such as these. Other physical forces, such as wind and water erosion can also move cultural material. In addition, anthills and rodent and badger burrowing have affected sites to a depth of 12". All of these biological forces have disturbed both the horizontal and vertical planes within archaeological sites and essentially destroyed the data potential of the top 12" of the sites. Hence, the effects of ground disturbing invasive plant management activities (such as grubbing plants and driving OHVs across sites during invasive plant spraying operations and post-spraying) on surface archaeological sites is miniscule.

Visual Resources

- How would the alternatives affect Visual Resource objectives?

This issue was not analyzed in detail because most invasive plant control activities have little likelihood of being noticeable to the casual observer three days after treatment. Even broadcast sprays typically use selective herbicides, and dead invasive plants are localized and only a portion of the total vegetation, often appearing to be experiencing a seasonal change. Large-scale treatments, usually of invasive annual grasses, are typically conducted in the late summer / early fall when they would appear more natural, and would be planned with appropriate specialist input when needed in sensitive viewing areas. Standard Operating Procedures (Appendix A) include requirements that project designs that do not attract attention, blend with topographic forms, and are restored to repeat existing line and color. Visual effects of preventative treatments following wildfire would not be dissimilar to those effects already created by a fire.

Environmental Justice

- How would the use of herbicides affect minorities and low-income populations?

This issue was not analyzed in detail because the Oregon FEIS analysis applies to the Burns District. The portion of the population living below the Federal poverty level in Harney County was 11.3 percent in 1999, compared to 13.1 percent for all of eastern Oregon (USDI 2010a:330). Like most remote rural counties, Harney County has a higher unemployment rate (12.3 percent) than the State of Oregon (7.7 percent), a lower per capita income ($33,536 compared to $39,848 statewide) and a higher proportion of individuals in poverty in 2013 (18.6 percent compared to 16.2 percent statewide. In 2013, 89 percent of residents were white alone, not Hispanic or Latino, 3.7 percent were Native American, while about 4.6 percent were Hispanic or Latino.[6] The FEIS analysis found a potential for contract and other crews to include a small disproportionate number of minority and / or poor (defined as below Federal poverty standards), and that "American Indian and visitors from other racial, ethnic, or low-income backgrounds participating in subsistence or cultural uses could be adversely affected by herbicide exposure, or by inadvertent effects to non-target culturally important plants, or to wildlife species of values to these groups" (USDI 2010a:333). However, that analysis noted such effects 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. The *Human Health and Safety* section in Chapter 3 addresses the potential for worker and public exposure to herbicide and non-herbicide treatments and finds, that

[6] The U.S. Census currently measures race and ethnicity independently; race refers to a person's self-identification as white, black, Native Hawaiian / Other Pacific islander, American Indian / Alaska native, or Asian, while ethnicity refers to Hispanic / Latino or non-Hispanic / Latino. Individuals can also identify themselves as belonging to two or more races.

while there is a measurable risk to workers under some scenarios, that risk is lower under the Proposed Action than under the No Action Alternative.

The FEIS analysis also 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 (USDI 2010a:333).

Human Health and Safety

- Are there health risks to firefighters from fires in recently sprayed areas?

This issue was not analyzed in detail because an analysis of the risk from volatilization of herbicide residues was done as part of the 1991 Vegetation Treatment on BLM Lands in Thirteen Western States FEIS. Based on this assessment, neither workers nor the public would be expected to be at risk from herbicide residues volatilized in a brown-and-burn operation (USDI 1991a). Wild or prescribed fire-volatilized herbicides are not identified as a risk in the Risk Assessments. More recent research was not found.

Tiering and Reference

This EA tiers to the Oregon FEIS for its herbicide treatments analysis,[7] and to the 1985 / 87 Northwest Area Noxious Weed Control Program Final EIS and Supplement (USDI 1985, 1987) for non-herbicide control methods. This EA also incorporates by reference elements of the 2007 *Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report,* which describes the integrated vegetation management program and discloses the general effects associated with non-herbicide control methods (USDI 2007b). The EA also tiers to the 2004 *Andrews Management Unit / Steens Mountain Cooperative Management and Protection Area Proposed Resource Management Plan and Final Environmental Impact Statement* (USDI 2004) and the 1991 *Proposed Three Rivers Resource Management Plan and Final Environmental Impact Statement* (USDI 1991b), which include invasive plant control activities in the full range of ongoing management activities for which environmental effects are described.

Decision to be Made

The District Manager for the Burns District will decide whether to adopt the Proposed Action and, if the Proposed Action is selected, whether to include helicopter landing in the wilderness for ingress and egress of treatment crewmembers, and for both parts of the decision, whether to modify the action based on factors identified during public review of this EA and the unsigned Finding of No Significant Impact. 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 decision would apply to all invasive plant control activities conducted on BLM-administered lands within the Burns District by its own personnel, contractors, permittees, grantors, leasees, cooperators, and others conducting activities on BLM-administered lands.

[7] The Oregon FEIS tiers to the 2007 *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) and incorporates the PEIS in its entirety as Appendix 1.

Consultation

Tribes

Tribal consultation was initiated in June 2011 with letters to the Klamath Tribes, the Burns Paiute Tribe, and the Confederated Tribes of the Warm Springs Reservation. The letters described the proposed EA, announced that scoping would begin in mid-June, and encouraged the Tribes to enter into government-to-government consultation and be involved with the process. The Klamath Tribes submitted an email stating they "strongly urge you to open a dialog with the affected Tribes to ascertain whether or not using pesticides will affect the health of Traditional Practitioners who gather botanicals at road side. […] It would be unacceptable to put our people's health in jeopardy."

Following a delay in the preparation of this EA, those three Tribes and the Fort McDermitt Paiute-Shoshone Tribe were contacted in December 2014 with letters and phone calls. The letters described the proposed EA and encouraged the involvement of the Tribes. In January 2015, the Klamath Tribes responded in support of the Proposed Action but indicated that they would not desire further consultation.

Consultation-identified issues, and resultant Project Design Features (mitigation measures), are addressed in detail in Chapter 3 of this EA under *Native American Interests and Uses*.

Oregon State Historic Preservation Office (SHPO)

As part of BLM's requirements under Section 106 of the National Historic Preservation Act, consultation with SHPO will occur as appropriate on Annual Treatment Plans to determine how vegetation treatments could impact cultural resources.

National Marine Fisheries Service

The District manages lands in the upper Malheur River drainage. These areas are at least 40 miles from the nearest federally listed anadromous fish. Because of this distance, and as a result of water impoundments found on these streams and the types of treatments proposed, the Proposed Action poses no credible possibility for adverse effects to anadromous fish. Formal consultation with the National Marine Fisheries Service was not initiated.

U.S. Fish and Wildlife Service

There are four federally listed species known on the District, including one endangered plant (Malheur wire-lettuce), one endangered fish (Borax Lake chub), and two threatened fish (bull trout and Lahontan cutthroat trout). Although Canada lynx is a listed threatened mammal and has been documented on the District historically, no recent sightings, lack of prey base on public lands in the District, and lack of sightings on Forest Service lands to the north would indicate that this species is currently not in the area and will not be considered in this document. In addition, there are three candidate species, including the Greater sage-grouse, the Columbia spotted frog, and the North American wolverine. The wolverine has been documented on the Steens Mountains but it is not known whether they are permanent residents or occasional strays due to the irregularities of the sightings. There is designated critical habitat for both the bull trout and Borax Lake chub on public lands in the District. The effects to these species (and critical habitat) from the Proposed Action were determined through consultation with the U.S. Fish and Wildlife Service as part of the Aquatic Restoration Biological Opinion II (ARBO II, USDI 2013c). Project Design Criteria for Invasive Plant Control outlined in the ARBO II were fully incorporated into Project Design Features of this EA. In the ARBO II, a *May Affect, Not Likely to Adversely Affect* determination was made for Borax

Lake chub, Malheur wire-lettuce and their critical habitats. A *Likely to Adversely Affect* determination was made for Lahontan cutthroat trout and bull trout. The Proposed Action was also determined not likely to jeopardize the continued existence of these fish species. The extent of take authorized in the ARBO II correlates to the extent of treated areas outlined in the Project Design Criteria of ARBO II (i.e. less than, or equal to, 10% of the acres in a riparian reserve within a 6th field HUC watershed/year).

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

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). Three Resource Management Plans (addressed in two Environmental Impact Statements) are the primary governing land use plans for the district and provide the following goals and management direction related to noxious weed management, vegetation management, and fire restoration activities.

Andrews Management Unit Resource Management Plan and the Steens Mountain Cooperative Management and Protection Area (CMPA) Resource Management Plan

Noxious Weeds

"Goal - *Control the introduction and proliferation of noxious weeds and reduce the extent and density of established populations to acceptable levels.*

- Objective 1. Treat noxious weeds and inventory for new infestations using the most effective means available, as outlined in the Burns District's Integrated Management Program EA / Decision Record.
- Objective 2. Create public awareness on how to utilize public land without inadvertently spreading noxious weeds.
- Objective 3. Maintain partnerships with local groups and government agencies to combine efforts in the control and prevention of noxious weed infestations" (USDI 2005a:31).

Management Direction

"Noxious weed prevention and control will continue to be a priority. [Noxious] weeds will be controlled in an integrated weed management program, which includes prevention, education, and cultural, physical, biological, and chemical treatments. Preventive measures such as public education and livestock and wildlife management will be employed to maintain or promote desirable vegetation cover and reduce distribution and introduction of noxious weed seed and plant parts. Mechanical and manual control methods and burning treatments will physically remove noxious weeds and unwanted or invasive vegetation; biological controls will introduce and cultivate factors such as insects and pathogens that naturally limit the spread of noxious weeds; and chemical treatments using approved herbicides will be applied where mechanical or biological controls are not feasible. Periodic inventories will detect new infestations. Monitoring the extent of known infestations is key to controlling or eradicating noxious weeds.

"Integrated management will be implemented for control of noxious weeds. Control on disturbed areas such as roads, ROWs [rights-of-way], waterholes, and recreational sites will be emphasized. Priority is given to land with high quality natural resource values. Emphasis is on prevention, restoration, research, and expanded efforts to inventory and detect new infestations.

"Public education concerning noxious weeds will be expanded to include areas outside Harney County. The Harney County Weed Management partnership will continue." (USDI 2005a:32)

Monitoring

"Noxious weed infestations are a serious threat to all vegetative communities. Monitoring is focused on identification of new infestations, spread of existing infestations, and effectiveness of treatment activities. Monitoring for new infestations is accomplished through inventories, most commonly in areas previously disturbed by fire or other disturbance-causing activities, and also in areas with high resource values where early detection is critical to maintain those values. Spread of existing infestations and treatment effectiveness are often monitored simultaneously using stem counts, various estimation techniques, and calculations using calibrated herbicide application equipment." (USDI 2005a:33)

Areas of Critical Environmental (ACECs)

Management Direction

"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 promotion of relevant and important values. Any weed control measures proposed in ACECs within WSAs[Wilderness Study Areas] will be consistent with WSA IMP direction." (USDI 2005a:70, USDI 2005b:32-33)

Greater Sage-Grouse

An objective of controlling invasive annual grasses is the maintenance of Greater sage-grouse habitat and sagebrush steppe ecosystems in general. The Andrews and Steens Mountain Resource Management Plans include a management goal and objectives for range management of:

Goal 2 - *Manage rangeland habitats so that forage, water, cover, structure, and security necessary to meet the life history requirements of wildlife are available on public land.*

> Objective 1. Manage big sagebrush, quaking aspen, and western juniper plant communities to meet habitat requirements for wildlife.
> Objective 2. Manage big sagebrush communities to meet the life history requirements of sagebrush-dependent species.

Language under these objectives includes "Management actions should be in conformance with the Migratory Bird Executive Order, the *Greater Sage-Grouse and Sagebrush-Steppe Ecosystem Management Guidelines* (USDI et al. 2000), the BLM National (or Oregon / Washington [OR / WA] State level) Sage-Grouse Habitat Conservation Strategy and the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* when approved" (USDI 2005a:31 and USDI 2005b:31). These documents generally address the control of noxious weeds. The since approved *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (ODFW 2011), for example, provides specific guidelines to "minimizing the impact of invasive noxious weeds on sage-grouse habitat," and goes on to describe issues and guidelines that closely parallel the categories and treatment objectives used in Chapter 2 of this EA to describe the Proposed Action (ODFW 2011:108).

Off-Highway Vehicles

The Steens Act, Section 112, and Resource Management Plan direction generally prohibit the use of Off-Highway Vehicles (OHVs) off of designated routes in the CMPA, with specific exceptions including, "for administrative purposes on a case-by-case basis as approved by the BLM Authorized Officer" (USDI 2005b:M-8). "In the CMPA,

OHV and mechanized vehicle in 60 percent of the area is limited to designated roads. The remainder is closed due to wilderness designation" (USDI 2005b:48). However, the Plan's Glossary excludes "vehicles in official use" from the definition of OHVs (USDI 2005b:101).[8]

Steens Mountain Wilderness and Wild and Scenic Rivers Plan

(Appendix P – Steens Mountain Cooperative Management and Protection Area Resource Management Plan)

This Plan includes *Management Direction* to:

- Identify and prioritize areas with noxious weed infestations in wilderness and WSRs and implement the treatment method(s) that best provides for [noxious] weed management or eradication, while protecting wilderness character.
- Continue with current outreach activities, which include handouts, displays, and posting information on noxious weed identification, and preventing the spread of noxious weeds. Consider targeting key public use areas like developed recreation sites or trailheads where there is a specific noxious weed concern.
- Maintain partnerships with local groups and government agencies to combine efforts in the control and prevention of noxious weed infestations.
- Control new infestations in the first year of discovery whenever possible (USDI 2005b:P39).

The Plan also includes *Monitoring* direction to:

- Noxious weed monitoring consists of annual surveys of high probability areas for [noxious] weed introduction, identification of new [noxious] weed introductions, and other inventories to determine the density and distribution of existing [noxious] weed populations (USDI 2005b:P59).

Steens Mountain Travel Management Plan (FONSI and Decision Record)

The Steens Mountain Travel Management Plan FONSI and Decision Record includes:

"Decisions previously made in the CMPA RMP [Resource Management Plan] remain in place and are not subject to change in this EA unless recent monitoring or inventory information warrants consideration for change." (USDI 2007d:13)

"BLM administrative functions related to a variety of natural resource management objectives (e.g., wild horse management, fish and wildlife monitoring, noxious weed control, restoration, fence repair, and enhancement) that potentially require motorized vehicle or equipment use off Base Routes or in wilderness will be addressed at the project level on a case-by-case basis, and documented in an MDA if proposed to occur in wilderness." (USDI 2007d:14)

Three Rivers Resource Management Plan

Noxious Weeds

"Control of noxious weeds is addressed in detail in the Northwest Area Noxious Weed Control Program EIS (USDI 1987). As such, noxious weed control needs in the RA were not considered to be a planning issue." (USDI 1992c:1-7)

[8] Herbicides may be applied using hoses and wands attached to tanks carried by ATVs. In addition, the Proposed Action includes sometimes landing helicopters in Wilderness to facilitate ingress and egress of plant control personnel during times of high fire danger.

Vegetation

Allocation / Management Action

"Apply approved [noxious] weed control methods including manual, biological and chemical control methods as identified in the Weed Control EIS and Burns District Weed Control EA in an integrated pest management program to prevent the invasion of noxious weeds into areas presently free of such weeds and to improve the ecological status of sites which have been invaded by weeds, weed control activities will be prioritized and funded based on the following criteria, as identified in Burns District's Weed Control EA:

Priority I: Potential New invaders - Emphasizes education and awareness.
Priority II: Eradication of New Invaders - Emphasizes eradication, priority funding.
Priority III: Established Infestations - Emphasizes containment and control."

(See glossary for definition of noxious weeds.[9])(USDI 1992c:2-53).

Interim Management Policies and Procedures for Greater Sage-Grouse

The current BLM interim policy for Greater sage-grouse habitat management is contained in IM 2012-043 issued December 27, 2011. This guidance will remain in effect until plan amendments are completed throughout the range of the species that address a comprehensive conservation strategy (USDI 2012a). Once a comprehensive strategy is adopted, it would replace these interim measures. The IM focuses on Preliminary Priority Habitat[10] and Preliminary General Habitat. Specific to this EA, the IM includes various direction aimed at limiting the spread of invasive plants.

Oregon Sub-Region Greater Sage-Grouse Draft Resource Management Plan Amendment and Environmental Impact Statement

The Resource Management Plans on the Burns District are expected to be amended with completion of the Oregon Sub-Region Greater sage-grouse Resource Management Plan Amendment and EIS and appurtenant Record of Decision. The Draft EIS has undergone public review, and the Final EIS is currently being prepared. The Preferred Alternative in the Final EIS is expected to include management direction to control invasive annual grasses in the proximity of Greater sage-grouse leks. The Record of Decision will replace IM 2012-043, (USDI et al. 2000), and other resource management plan-referenced strategies.

Federal Laws Relating to Invasive Plant / Noxious Weed Management

Several Federal laws 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

[9] The Andrews Management Unit and Steens Mountain CMPA Resource Management Plans define noxious weed as "A plant specified by law as being especially undesirable, troublesome, and difficult to control. A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the United States. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health" (USDI 2004:6-6). The Three Rivers Resource Management Plan glossary defines noxious weeds using only the Federal Noxious Weed Act portion of the above definition.

[10] Also known as Preliminary Priority Management Areas

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.

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 2010b:30). This EA provides the site-specific analysis for the Burns District. 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 2010b: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 2010b:33), the Conservation Measures for Special Status species shown in Oregon Record of Decision Attachment B (USDI 2010b:47), and the Oregon Mitigation Measures[11] included in the Oregon Record of Decision (USDI 2010b:12-15), all included in Appendix A of this EA, as well as the typical and maximum application rates if they are less than those in the existing district NEPA documents (USDI 2010b:10-11).

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).

Wilderness Act of 1964

The Wilderness Act of 1964 governs activities in the Steens Mountain Wilderness. That act generally prohibits the use of motor vehicles "…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"[12]

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 (EPA). The memorandum directs the creation of national Pollinator Health Strategy with research, education, and public-private partnership objectives. It further directs agencies to develop

[11] Mitigation measures are practices or limitations adopted to mitigate potential adverse effects identified in the PEIS and Oregon FEIS analysis.
[12] A part of the Proposed Action is to land helicopters in Wilderness to facilitate ingress and egress of plant control personnel during times of high fire danger.

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 are not expected to conflict with, treatments described in this EA.

Secretarial Order on Rangeland Fire Prevention, Management, and Restoration

On January 5, 2015, the Secretary of the Interior issued an Order (Secretarial Order 3336) setting forth policies and strategies for preventing and suppressing rangeland fire and restoring sagebrush landscapes impacted by fire. These actions are needed for conserving habitat for the greater sage-grouse and other species and for economic activity (such as ranching and recreation) associated with the sagebrush-steppe ecosystem. The Order states, “The accelerated invasion of non-native annual grasses, in particular cheatgrass and medusahead rye, and the spread of pinyon-juniper across the sagebrush-steppe ecosystem, along with drought and the effects of climate change, have created conditions that have led to the increased threat of rangeland fires to the sagebrush landscape and the more than 350 species of plants and animals, such as mule deer and pronghorn antelope, that rely on this critically important ecosystem. As a result, the increasing frequency and intensity of rangeland fire also poses a significant threat to ranchers, livestock managers, sportsmen, and outdoor recreation enthusiasts who use the sagebrush-steppe ecosystem, and puts at risk their associated economic contributions across this landscape that support and maintain the American way of life in the West.” The Order further directs a task force to “Seek to reduce the likelihood, size, and severity of rangeland fires by addressing the spread of cheatgrass and other invasive, non-native species.”

Chapter 2 – The Alternatives

Introduction

This Chapter describes two alternatives in detail, the No Action Alternative and the Proposed Action. These are the alternatives addressed in the effects analysis in Chapter 3. This Chapter also describes other alternatives that were considered but not carried forward for detailed study.

Both the No Action and the Proposed Action Alternatives address the dynamic nature of invasive plants[13] including increasing numbers of invasive plant species, different plant physiologies, and changing conditions of infestations. Due to the nature of invasive plants and the size of the land base involved and the nature of multiple uses that take place on it, invasive plant control would remain an ongoing need. The intent of the program is to manage invasive plants in order to minimize adverse ecological and economic impacts.

Background – Invasive Plant Management

As noted in Chapter 1, the Proposed Action would expand and update the existing Noxious Weed Management Program, primarily with the district-wide addition of 10 more herbicide active ingredients and the addition of non-native invasive plants other than noxious weeds to the types of plants that can be treated with herbicides. These would be changes in the "direct control," or *integrated invasive plant management* portion of the district's invasive plant management program. Other elements of the program would stay the same. For context and a better understanding of the district's entire invasive plant management program, elements of the program that would remain unaffected by the alternatives are presented in this section. These elements are the product of decades of laws, Executive Orders, and BLM and Department of the Interior policies, and direction. They are grouped here by the goal statements in the BLM's *Partners Against Weeds, Final Action Plan for the BLM* (USDI 1996).

Prevention, Detection, Education, and Awareness

Prevention, detection, education, and awareness are the highest priority for the management of invasive plants. The district maintains a Weed Prevention Schedule that outlines prevention steps from cleaning vehicles and equipment before moving onto BLM-administered lands to helping with an invasive plant education booth at the County fair. Specific responsibilities are assigned for keeping administrative sites clear, reestablishing vegetation on disturbed sites, inspecting gravel and other materials sites, and including invasive plant prevention measures in all planning documents. Other activities continue to educate employees, contractors, and the public. District staff, often in cooperation with the Harney County Cooperative Weed Management Area (CWMA),[14] publish news articles; sign all major recreation sites; require weed-free forage for pack stock and weed-free seed for re-vegetation projects; conduct invasive plant awareness meetings in communities and with hay growers and other groups; teach invasive plant awareness in local schools and with Tribal governments; teach monitoring techniques

[13] The inclusive term "invasive plants" is used here for simplicity. Herbicide use under the No Action Alternative is limited to noxious weeds, a subset of invasive plants.

[14] Harney County CWMA members include Harney County, Harney County Weed Board, Oregon Department of Agriculture, Bureau of Land Management Burns District, United States Forest Service Emigrant Creek Ranger District, Harney County Soil & Water Conservation District, Oregon Department of Transportation District 14, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Malheur Wildlife Refuge, Harney County Watershed Council, Cities of Burns and Hines, Paiute Tribe, Bureau of Indian Affairs, Oregon State University (OSU) / ARS-Eastern Oregon Research Station, OSU Burns Extension Office, and Division of State Lands.

to landowner groups; and, coordinate direct control and other activities with County, State, and other agency invasive plant control programs and transportation departments.

Additionally, BLM policy requires that planning for ground-disturbing projects in the district, or those that have the potential to alter plant communities, include an assessment of the risk of introducing noxious weeds.[15] If there is a moderate or high risk of spread, actions to reduce the risk must be implemented and monitoring of the site (see *Monitoring* section below) must be conducted to prevent establishment of new infestations (USDI 1992b). A complete list of prevention measures applicable to projects or vegetation treatment actions is included in Appendix A, *Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*.

Inventory

Invasive plant inventories[16] can be conducted district-wide, but particularly focus on areas planned for ground-disturbing activities, areas burned by wildfire, road corridors and other rights-of-way, riparian / wetland areas, and public and permittee activity areas such as campgrounds, trailheads, and livestock water developments where invasive plants are most likely to occur and to spread from. Generally, whenever inventories occur on the district, new invasive plant sites are discovered. Inventories are conducted as projects demand and funding allows.

In general, inventory priorities may be summarized as follows:

1. High use areas with potential for new introductions
2. Areas with potential for spread
3. Areas with important value resources[17]
4. Areas designated for planned disturbances
5. All remaining sites

While certain inventories may be specific to invasive plants, inventories conducted for other purposes also record the presence of invasive plants. Such surveys include clearance surveys for Special Status species or cultural resources, inventories for special management areas, fire monitoring, range trend and use monitoring, rangeland health assessments, and others.

Inventory results are uploaded to the BLM's National Invasive Species Information Management System (NISIMS), which links to the BLM planning and reporting systems. NISIMS records are regularly updated, the areas are regularly monitored, the invasive plant species at the site are recorded, and treatment options have been identified. Former sites (sites where the species appears to have been eradicated) may be retained in NISIMS to guide future site monitoring.

Planning

Setting treatment priorities is primarily driven by the resources that would be adversely affected by the invasive plants such as native plant community function, water, riparian areas, habitats for Special Status species, special management areas (such as Wilderness, Wilderness Study Areas (WSAs), or Research Natural Areas (RNAs)), resources or areas important to local tribes, and erodible and medusahead rye-susceptible soils. Other considerations include: the risk of spread (e.g. if it is along a road or recreation site where it can be easily picked up

[15] Current handbook direction only requires this assessment for noxious weeds.
[16] Inventories are the first examination of an area to find invasive plants. Invasive plant searches on recently disturbed areas and previously treated invasive plant sites are considered monitoring.
[17] e.g., Special Status species habitat, special management areas, such as Wilderness, or resources or areas important to local tribes.

and moved long distances, or if it is next to a site-disturbing activity that it can spread into); the species and its priority on State and County noxious weed control lists; the size of the infested area and whether the site is isolated or near others; whether the plants are unacceptably increasing the risk of wildfire; and, the control priorities of BLM neighbors and cooperators. Knowledge of the control methods that would work for each species and that are appropriate for the lands infested also informs the prioritization process.

The number of acres treated annually is based on available funding, weather, and vegetation condition. In general, the district's strategy is as follows:

- Eradicate new locations of invasive plants of known threat, including those identified as priority by the Oregon Department of Agriculture and Harney County.
- Eradicate small infestations of invasive plants known to have potential for ecological or economic impact and / or be a threat in areas with potential for spread such as roads, trails, rights of-way, recreation sites, rivers and streams, and mineral material sites.
- Manage invasive plant species to contain populations and minimize adverse impacts to ecological function and economic values.

Annual Treatment Plans - The district determines potential treatments based in part on available tools and funding, and develops an Annual Treatment Plan at least 30 days prior to the beginning of control treatments in the spring. An interdisciplinary team reviews the plan to ensure it includes planned disturbance areas[18] and conforms to design and mitigation standards in the relevant NEPA documents. It is then forwarded to interested Tribes with an invitation to consult about that year's plans. Annual Treatment Plans also help the district ensure that required NEPA, Pesticide Use Proposals, Biological Control Agent Release Proposals, and other required steps are completed in a timely manner. Every control treatment, however, is not always on the Annual Treatment Plan. Unexpected events such as increased or decreased funding, new invaders, wildfire, or weather conditions could alter implementation of the Annual Treatment Plan..

Coordination

The Burns District works cooperatively with the Grant and Harney County CWMAs. The district works closely with Harney County, where grant moneys and BLM contributions help fund the County's Strategic Weed Attack Team (SWAT), which by agreement conducts a large portion of the BLM's Early Detection Rapid Response (EDRR) fieldwork. For example, SWAT work in fiscal year 2013 included 23,869 acres of inventory, 110 acres of invasive plant treatments, and 236,072 acres of monitoring. The BLM also participates in multiple landowner projects coordinated with the CWMA, such as a 15,646-acre medusahead control treatment using helicopters in 2012 that was half on BLM lands, and half on private lands. Most of the off-district education and awareness events that the BLM participates in were coordinated through the CWMA.

The district coordinates activities with local, State, and Federal agencies, tribal governments, and private landowners. Coordination includes the implementation of prevention and education activities, sharing of inventory and monitoring information, research, and developing annual treatment programs.

The district coordinates the management activities of permittees and others with a responsibility to control invasive plants in their permit areas. District personnel meet annually with the Oregon Department of Transportation, for example, to discuss and plan highway rights-of-way invasive plant treatments and associated BLM reporting requirements.

[18] Such as prescribed fires and other planned and recent ground-disturbing management activities as appropriate.

Monitoring

Monitoring includes regular checking of previously treated sites as well as recently disturbed sites including prescribed and wild fire areas. As noted in the *Prevention, Detection, Education, and Awareness* section above, BLM policy requires new project areas with high likelihood of invasive plant introduction[19] to be monitored for the first three years after completion. Burns District protocol also calls for monitoring areas burned by wildfire for three years post-fire. More than 200,000 acres of invasive plant monitoring was accomplished in fiscal year 2013. This monitoring included known invasive plant sites (typically previous treatment areas), wildfire areas from previous years, forest health projects, and landscape scale projects involving prescribed burning. Monitoring generally occurs annually on high-priority sites, and every three-to-five years on lower priority sites. All known infested sites are regularly monitored in order to update records and their prioritization needs for treatment.

The Andrews and Steens Mountain Resource Management Plans include the following monitoring requirements in their noxious weed sections. Existing BLM policy requires similar monitoring in all areas.

> Noxious weed infestations are a serious threat to all vegetative communities. Monitoring is focused on identification of new infestations, spread of existing infestations, and effectiveness of treatment activities. Monitoring for new infestations is accomplished through inventories, most commonly in areas previously disturbed by fire or other disturbance-causing activities, and in areas with high resource values where early detection is critical to maintain those values. Spread of existing infestations and treatment effectiveness are often monitored simultaneously using stem counts, various estimation techniques, and calculations using calibrated herbicide application equipment (USDA 2005a:33, USDA 2005b:33).

Additionally, the Record of Decision for the *Vegetation Treatments Using Herbicides on BLM Lands in Oregon FEIS* requires, for at least five years, that aerial application of acetolactate synthase (ALS)-inhibitors[20] conceivably affecting private lands or Special Status species be monitored for drift (USDI 2010b:17). Other portions of the Oregon Record of Decision-adopted monitoring may be assigned to the Burns District. For example, The Oregon Record of Decision specifies that two large imazapic treatments will be examined approximately one year after treatment, and the resultant report circulated to other districts to help guide future planning with this newly-available herbicide (USDI 2010b:16-17).

Additional monitoring is included under each alternative.

[19] Generally any type of project resulting in ground disturbance, such as juniper cut / pile / burn units, timber harvest areas, and range improvements such as fences, spring developments, dams, and pipelines.
[20] See the *Invasive Plants* section in Chapter 3 for more information about ALS-inhibitors. The five ALS-inhibitors are imazapyr, imazapic, sulfometuron methyl, chlorsulfuron, and metsulfuron methyl.

The Alternatives

Two alternatives, the No Action Alternative and the Proposed Action, are presented in this section.

Elements Common to Both Alternatives

Integrated Invasive Plant Management

Direct control treatments addressed in this EA include manual (pulling or grubbing), mechanical (chainsaws, mowers), biological (targeted grazing), and classical biological (insects), prescribed fire, and herbicides. See additional information about the each treatment method below.[21]

Selection of a treatment method considers what would work for each species and what is appropriate for the lands infested (including what nearby resources may be affected). For many species, small infestations may be controlled with manual or other non-herbicide treatments. Others may require herbicides to obtain control or reduce ground disturbance. The selection of a treatment method is guided by Department of the Interior policy which states "Bureaus will accomplish pest management through cost-effective means that pose the least risk to humans, natural and cultural resources, and environment" and requires bureaus to "[e]stablish site management objectives and then choose the lowest risk, most effective approach that is feasible for each pest management project" (USDI 2007c).

Treatments are constrained by existing BLM Standard Operating Procedures and subject to PEIS and Oregon FEIS Mitigation Measures (Appendix A), and to the Andrews / Steens Resource Management Plan Best Management Practices. Conservation Measures also apply to Special Status species (see Appendix A). These measures are designed to prevent adverse effects from invasive plant control treatments including those using herbicides.

Generally, control activities are subject to cultural resources and Special Status species clearance surveys. Urgent treatments[22] of newly discovered satellite infestations may be made by personnel familiar with these sensitive resources. Such treatments would usually be manual (e.g. grubbing) or spot spraying on less than an acre, and are most likely to be along streams, or near existing roads and other previously disturbed areas.

Additional Information about Treatment Methods

Manual Treatment Methods, such as pulling and grubbing plants, can be used to control some invasive plants, particularly if the population is relatively small. These techniques can be extremely specific, minimizing damage to non-target plants, but they are generally labor and time intensive (Tu et al. 2001). Treatments often must be conducted several times annually to prevent the invasive plant from re-establishing. In the process, crews may trample vegetation and disturb soil, providing prime conditions for re-invasion by the same or other invasive plants. Manual techniques can be effective for small infestations and / or where a large pool of labor is available. They can be used in combination with other techniques, for example, when shrubs are pulled and cut, and re-sprouts and seedlings can be treated with herbicides or fire several weeks or months later (Tu et al. 2001).

[21] Seeding and planting can be used to control invasive plant problems by establishing the desired plant species, particularly when other treatment methods cause ground disturbances that would attract invasive plants. However, because most invasive plant control sites are expected to retain enough existing desirable vegetation to reclaim the site, and because seed species mixes for other sites is unknown, seeding and planting would be subject to additional NEPA compliance documentation.
[22] Treatments can be urgent either because the plant is about to go to seed, or because, with 3.276 million acres on the district, the discoverer is so far from the office that an additional visit to treat a small site is not practical.

Mechanical Treatment Methods include weed whackers, chainsaws, and mowing. Some of these methods (e.g. chainsaws and weed whackers) can be more target-specific than others; all methods share some of the drawbacks that manual methods do (need of repeat treatment, disturbed vegetation and soil disturbance can promote invasive plants, disturbance to non-target species, etc.). Non target-specific treatments are restricted to monocultures or where existing desirable vegetation would not be as affected by the treatment and thus be in a better position to reclaim the site.

With mechanical and manual methods, equipment and clothing must be cleaned before moving to other sites, to reduce the possibility of spreading invasive plants to the next worksite.

Biological Treatment Methods involve the intentional use of domestic animals, insects, nematodes, mites, or pathogens (agents such as bacteria or fungus that can cause diseases in plants) that weaken or destroy vegetation (USDI 2007b). Biological control is used to reduce the targeted invasive plant population to an acceptable level by stressing target plants and reducing competition with desirable plant species.

Classical biological control involves the intentional use of insects, nematodes, mites, or pathogens (agents such as bacteria or fungi that can cause diseases in plants) that weaken or destroy vegetation (USDI 2007b). Plant-eating insects, nematodes, mites, or pathogens affect plants directly, by destroying vital plant tissues and functions, and indirectly, by increasing stress on the plant, which may reduce its ability to compete with other plants (USDI 2007b). Often, several biological control agents are used together to reduce the density of undesired vegetation to an acceptable level.

Biological control agents currently used by the BLM have been tested by the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS) and reviewed and permitted for release by USDA Animal Plant Health Inspection Service (APHIS) to ensure that they are host-specific and will feed only on the target plant and not on crops, native flora, or endangered or threatened plant species.

Targeted grazing[23] is the purposeful application of a specific kind of livestock at a determined season, duration, and intensity, to accomplish defined vegetation or landscape goals (Launchbaugh and Walker 2006). The basic goal of targeted grazing is to give the desired plants a competitive advantage over the target plant or plants. A successful grazing prescription should: 1) cause significant damage to the target plant; 2) limit damage to the surrounding vegetation; 3) be integrated with other control methods as part of an overall landscape management strategy; and 4) be compatible with the needs of domestic animals and other multiple use objectives in the area (USDI 2007b:2-16). The District has been participating in projects on private lands, using goats to manage invasive plants. The District is currently using winter targeted grazing with cattle on one allotment to control cheatgrass and medusahead rye. As with classical biological controls, targeted grazing can reduce invasive plant abundance at a particular site, but it will rarely, if ever, completely eradicate them.

The District has also been involved in a project with the Harney County Cooperative Weed Management Area to train cows to eat invasive plants. A process is available for teaching cows to eat specific vegetation using behavioral and nutritional principles. The trained cows will then train the rest of the herd and they will eat invasive plants wherever they encounter them, including in their BLM allotments (Voth 2010).

Prescribed fires are occasionally used for invasive plant control, and can be most effective when conducted just before flower or seed set, or at the young seedling / sapling stage. Like other treatments, timing is critical and is dependent on characteristics of the invasive plant, desirable plants, soil moisture, and environmental conditions. Other treatment methods are often used in conjunction with fire, including the use of herbicides. In some cases, prescribed burns can unexpectedly promote an invasive, particularly when their seeds are adapted to fire, or when they resprout vigorously. Prescribed fires considered in this EA are targeted at Category 1 and 2 invasive plants only

[23] Also referred to as directed livestock grazing, prescribed grazing, and others.

(see Category descriptions below). Prescribed fires in other categories (e.g. Category 5, invasive annual grasses) would be subject to additional NEPA compliance documentation.[24]

Herbicide Treatment Methods include ground-based methods (including hand-held wands, truck or OHV-mounted booms) and aerial methods.

Herbicides are often the most effective control method:

- on pure stands of a single invasive plant where desirable and non-target plants are scarce or absent;
- for rhizomatous species that would otherwise require repeated cutting or pulling for control;
- on plants whose characteristics make them difficult or impossible to remove with non-herbicide methods;[25]
- in areas where non-herbicide methods are cost prohibitive;
- in areas where non-herbicide methods have unacceptable adverse impacts to native plants;
- in areas where heavy soil disturbance is not acceptable;
- for species located in remote areas or limited access where non-herbicide methods are not feasible;
- in combination with other control treatments (for example, woody species like saltcedar and Russian olive can be controlled by cutting stems close to the ground in the fall and then spraying or wiping the stems with an herbicide registered for this use).

Herbicides are applied to lands and uses for which they are labeled by certified or licensed applicators or persons working under their direct supervision (USDI 2010a:85). A Pesticide Application Record is completed within 24 hours of the application documenting environmental conditions at the time of treatment as well as actual herbicide use. This record, kept in district files for ten years, helps the BLM duplicate successes, change procedures that are not working, and to understand when and if unintended on or off-site effects occur.

Herbicide formulations (brands), as well as adjuvants to be used with them, must be on the BLM lists of approved herbicides and adjuvants at the time of application. The current lists are included in Appendix B, *The Herbicides, Formulations, and Adjuvants,* for information. For applications with a potential to enter streams, herbicides are limited to aquatic formulations. For applications with a potential to affect federally listed fish, aquatic-approved adjuvants[26] would also be used (see Appendix B).

Ground-based herbicide applications are often done with a backpack foliar sprayer. This is usually done only in small areas, in areas inaccessible by vehicle, and in areas where invasive plants are scattered. A backpack sprayer is used because it can be used where access is limited. Treatments with these types of sprayers can target specific plants, so that effects to non-target species can be kept to a minimum. Backpack sprayers are generally levered, not motorized. For woody species, herbicides may also be basally applied with a spray bottle, wick (wiped on), or wand (sprayed on). Herbicides can be applied to trees around the circumference of the trunk on the intact bark (basal bark), to cuts in the trunk or stem (frill, or "hack and squirt"), to cut stems and stumps (cut stump), or injected into the inner bark.

Ground-based herbicide application is also done with spreaders or hand-held sprayers attached to vehicle-mounted tanks. Spray tank sizes vary from 15-25 gallons on an ATV or utility vehicle (UTV), to 100 or more gallons on a truck. Using a large tank provides the advantage of less loading and mixing of herbicides, which, in turn, leads to less accidental spills and a more accurate rate of application. Some of these ATV / truck applications are done off-road with a hand-held sprayer attached to a small tank, with the remaining done from an existing road, trail, or right-of-way. Most of these applications have been spot treatments (e.g., hand-held sprayers connected by hose to the tank); fewer have been done with spreaders or booms.

[24] Seeding is not analyzed as part of this EA.
[25] For example, Canada thistle root fragments readily resprout.
[26] The "approved adjuvants" shown in Appendix C are from the U.S. Fish and Wildlife ARBO II biological opinion (USDI 2013c). This list will be modified by the Decision Record if U.S. Fish and Wildlife Consultation for this EA results in a different list.

A small percentage of treatments are done by horseback. This is generally done in areas where ATV access is not practical (e.g. susceptible habitat, wilderness areas, areas with steep terrain), but where a larger than backpack tank size is needed.

Aerial herbicide applications can be conducted with helicopters or fixed-wing aircraft. Operation of helicopters is more expensive than operation of fixed-wing aircraft, but helicopters are more maneuverable and can fly closer to the ground over uneven terrain. Aerial applications methods are almost always used for control of large infestations often following wildfires, or to apply imazapic for the control of invasive annual grasses.

Categories

More than 26,000 acres of invasive plant sites are documented on the district. Thousands of acres of additional, undetected and / or undocumented invasive plants are also likely to occur anywhere on the Burns District. In particular, hundreds of thousands of acres of invasive annual grasses are unmapped, primarily because a control method selective to these grasses has not been available to the district until recently. Because treatments can vary for different invasive plant species and the management objective that applies to their control, the following Categories of known or estimated invasive plant sites are described to help clarify the alternatives and the analysis.

Categories 1, 2, 3, and 6 address invasive plants *other than* the invasive annual grasses cheatgrass, medusahead, ventenata, and others. Category 4 addresses the control of both invasive annual grasses and other invasive plants in and adjacent to recent and future wildfire areas. Category 5 addresses the existing invasive annual grasses on the district.

Category 1. Existing documented sites

NISIMS (described in the Inventory section earlier in this Chapter) includes approximately 26,000 acres of documented invasive plant sites within the district.[27] This does not include invasive annual grasses (which are addressed in Category 5).These sites are displayed in Map 2-1 and summarized on Table 2-1.

Table 2-1. Summary of Documented Invasive Plant Sites[1]

Common Name ***Scientific Name***	**Noxious Weed Classification**[2] County[3] / ODA[4]	**Number of sites** ***Acres***	**Common Habitat**	**Table 2-10 (*Treatment Key*) Species Group**
Bull Thistle *Cirsium vulgare*	NI[5] / B	1741 sites *8,333 acres*	Rangeland, Wetland, ROW	Thistles (annual and biennial)
Canada Thistle *Cirsium arvense*	C / B	2809 sites *6,685 acres*	Rangeland, Wetland, Riparian, ROW	Russian Knapweed and Perennial Thistles
Whitetop *Cardaria draba (Lepidium draba)*	C / B	397 sites *2,875 acres*	Rangeland, Wetland, ROW	Mustards
Scotch Thistle *Onopordum acanthium*	B / B	877 sites *2,841 acres*	Rangeland, Wetland, ROW	Thistles (annual and biennial)
Perennial Pepperweed *Lepidium latifolium*	B / B	109 sites *2,325 acres*	Rangeland, Wetland, Riparian, ROW	Mustards
Russian Knapweed *Acroptilon repens*	B / B	77 sites *1,126 acres*	Rangeland, Wetland, Riparian, ROW	Russian Knapweed and Canada Thistle
Mediterranean Sage *Salvia aethiopis*	B / B	35 sites *647 acres*	Rangeland, Wetland, ROW	Mediterranean sage
Dalmatian Toadflax *Linaria dalmatica*	B / B	411 sites *467 acres*	Rangeland, Wetland, ROW	Toadflax

[27] This category also includes species that have apparently been eradicated, but the sites are retained in the database for monitoring purposes.

Common Name ***Scientific Name***	**Noxious Weed Classification**[2] County[3] / ODA[4]	**Number of sites** ***Acres***	**Common Habitat**	**Table 2-10 (*Treatment Key*) Species Group**
Diffuse Knapweed *Centaurea diffusa*	NI / B	78 sites *272 acres*	Rangeland, Wetland, ROW	Knapweed (Diffuse and Spotted)
Spotted Knapweed *Centaurea stoebe (C. maculosa)*	A / B	106 sites *253 acres*	Rangeland, Wetland, ROW	Knapweed (Diffuse and Spotted)
Houndstongue *Cynoglossum officinale*	B / B	100 sites *96 acres*	Rangeland, Wetland, ROW	Houndstongue
Halogeton *Halogeton glomeratus*	C / B	12 sites *54 acres*	Rangeland, Wetland, ROW	Halogeton
Russian Olive *Elaeagnus angustifolia*	NI / NI	3 sites *10 acres*	Wetland, Riparian	Tamarisk and Russian Olive
Puncturevine *Tribulus terrestris*	B / B	4 sites *8 acres*	Rangeland, Wetland, ROW	Puncturevine
Yellow Starthistle[6] *Centaurea solstitialis*	A / B	6 sites *7 acres*	Rangeland, Wetland, ROW	Starthistles
Field Bindweed / Perennial Morning Glory *Convolvulus arvensis*	C / B	25 sites *5 acres*	Rangeland, Wetland, ROW	Field Bindweed
Tamarisk / Saltcedar[6] *Tamarix ramosissima*	A / B	11 sites *3 acres*	Wetland, Riparian	Tamarisk and Russian Olive
St. John's wort / Klamathweed *Hypericum perforatum*	C / B	10 sites *2 acres*	Rangeland, Wetland, ROW	St. John's wort
Black Henbane *Hyoscyamus niger*	A / NI	15 sites *2 acres*	Rangeland, Wetland, ROW	Thistles (annual and biennial)
Musk Thistle *Carduus nutans*	A / B	10 sites *less than 1 acre*	Rangeland, Wetland, ROW	Thistles (annual and biennial)
Purple Loosestrife *Lythrum salicaria*	A / B	13 sites *less than 1 acre*	Wetland, Riparian	Purple loosestrife
Tansy Ragwort[6] *Senecio jacobaea*	A / B	6 sites *less than 1 acre*	Rangeland, Wetland, ROW	Ragwort, Tansy
Dyer's Woad[6] *Isatis tinctoria*	NI / B	1 sites *less than 1 acre*	Rangeland, Wetland, ROW	Mustards
Kochia *Bassia scoparia*	NI / B	Unknown	Rangeland, ROW, Wetland	Annual Broadleaves
Poison hemlock *Conium maculatum*	NI / B	Unknown	Wetland	Hemlock

1. This table does not include cheatgrass, Medusahead rye, and ventenata invasive annual grasses that are discussed in Table 2-5 (*Invasive Annual Grasses*).
2. Noxious weeds are classified by the Oregon Department of Agriculture (ODA) and / or Harney County for the purpose of prioritizing and implementing noxious weed control projects.
3. Harney County noxious weed Classifications:
   A. A weed of known economic importance known to occur in the County in small enough infestations to make eradication practicable or not known to occur but its status in surrounding counties makes future occurrence seem imminent.
   B. A weed of known economic importance and of limited distribution in the County, and is subject to intensive control or eradication where feasible at the County level.
   C. A weed of known economic importance and of general distribution that is subject to control, intensive control, or eradication as local conditions warrant.
4. ODA noxious weed Classifications:
   A. A weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible.
   B. A weed of economic importance which is regionally abundant, but which may have limited distribution in some areas.
5. NI: Not included on the ODA and / or Harney County noxious weed lists.
6. These invasive plant species have been documented and eradicated on the district. However, sites continue to be monitored yearly.

Category 2. Spread from existing documented sites

The approximately 26,000 acres of documented sites in Category 1 are increasing in size, particularly where current treatments are marginally effective. New sites arise from activities such as vehicle use, recreation activities, and ground-disturbing activities including prescribed fires[28] (see Table 2-2) and wildfire suppression activities, as well as natural vectors such as wind, water, wildlife, and wildfire. Some of these primary vector corridors (prescribed fire, roads and mineral material sites, recreation sites and trails, and waterways and water developments) can be represented spatially (Maps 2-2, 2-3, 2-4, and 2-5); these sites help focus inventory and monitoring efforts. The approximately 26,000 acres of invasive plants summarized on Table 2-1 are estimated to be spreading about 12 percent annually (USDI 2010a:135).[29]

Table 2-2. Summary of Prescribed Fire Areas (1996-2014)

Prescribed Fire Fiscal Year	Number of Fires	Total Fire Acres	Average Fire Acres
2014	46	15,079	328
2013	44	2,910	66
2012	94	14,554	155
2011	63	7,957	126
2010	84	31,768	378
2009	22	28,241	1,284
2008	50	4,465	89
2007	127	10,330	81
2006	69	22,463	326
2005	35	6,072	173
2004	18	4,727	263
2003	11	5,004	455
2002	5	1,175	235
2001	10	29,331	2,933
2000	2	1,090	545
1999	16	19,027	1,189
1998	21	3,017	144
1997	16	10,916	682
1996	18	2,955	164
Total	**751**	**221,083**	**294 (average)**

Category 3. New invaders

Species of noxious or invasive plants that have not been previously documented on the district can be introduced at any time. This is believed to happen from some to many times per year. Initial infestations are small, but may become large before being discovered. Common routes of spread, roads and waterways, are checked regularly. Species of concern currently not yet documented on the district but documented on adjacent lands are displayed on Table 2-3. These are on the district's watch list.

[28] Prescribed fires are conducted for a variety of resource objectives. They burn at different intensities than wildfires, and thus do not create the same treatment needs as wildfires. As projects causing disturbances, however, they can be invaded by invasive plants and are thus monitored.

[29] Under the Proposed Action, the Oregon FEIS estimates the spread rate would be reduced over time to seven percent (USDI 2010a:152). These numbers are discussed in more detail in the *Invasive Plants* section in Chapter 3 of this EA.

Table 2-3. Invasive Plants Documented on Neighboring Lands but Not Known to Occur on the District

Common Name	Scientific Name	Noxious Weed Classification County / ODA[1]	Table 2-10 (*Treatment Key*) Species Group
African rue	*Peganum harmala*	A / A	African rue
Common crupina	*Crupina vulgaris*	NI[2] / B	Starthistles
Flowering rush	*Butomus umbellatus*	NI / A	Aquatic plants
Knotweeds (giant, Himalayan, and Japanese)	*Fallopia sachalinensis* *Polygonum polystachyum* *Fallopia japonica*	NI / B	Aquatic plants
Leafy spurge	*Euphorbia esula* L.	A / B	Starthistles
Orange hawkweed	*Hieracium aurantiacum*	A / A	Starthistles
Plumeless thistle	*Carduus acanthoides*	NI / A	Thistles
Purple starthistle	*Centaurea calcitrapa*	NI / A	Starthistles
Rush skeletonweed	*Chondrilla juncea* L.	A / B	Starthistles
Squarrose knapweed	*Centaurea virgate*	A / A	Knapweed (diffuse and spotted)
Taurian thistle	*Onopordum tauricum*	NI / A	Thistles (annual and biennial)
Water primrose	*Ludwigia*	NI / B	Aquatic plants
Yellow floating heart	*Nymphoides peltata*	NI / A	Aquatic plants
Yellow flag iris	*Iris pseudacorus*	NI / B	Aquatic plants

1. ODA noxious weed Classifications:
   A. A weed of known economic importance, which occurs in the State in small enough infestations to make eradication or containment possible.
   B. A weed of economic importance, which is regionally abundant, but which may have limited distribution in some areas.
2. NI: Not included on the Harney County noxious weed list.

Category 4. Post-fire emergency stabilization and rehabilitation areas

Certain emergency stabilization treatments are conducted immediately following wildfires, in order to protect sensitive resources like soils from being lost to subsequent wind and rain events. Invasive plants of all kinds, particularly the invasive annual grasses, readily invade these newly disturbed areas, inhibiting revegetation efforts. Invasive plant control treatments during the first fall, winter, and spring are critical to slowing the expansion of invasive annual grasses and allowing stabilization and rehabilitation efforts to succeed. Annual wildfire acres from 1992 through 2014 ranged from 371 to 311,825 acres (Map 2-6 and Table 2-4), with an average of 3,501 acres. Annual wildfire acreage will likely increase in the future as invasive annual grasses become more widespread, and the climate becomes warmer and drier (D'Antonio and Vitousek 1992, Abatzoglou and Kolden 2011).

Table 2-4. Summary of Recent Wildfire (1992-2014)

Fire Year	Number of Fires	Total Fire Acres	Average Fire Size
2014	21	145,344	6,921
2013	14	14,998	1,071
2012	9	311,825	34,647
2011	17	19,197	1,129
2010	3	376	125
2009	6	1,322	220
2008	3	4,634	1,545
2007	30	198,598	6,620
2006	45	153,675	3,415
2005	12	10,891	908
2004	3	371	124
2002	9	3,022	336
2001	30	44,091	1,470

Fire Year	Number of Fires	Total Fire Acres	Average Fire Size
2000	10	16,540	1,654
1999	18	16,507	917
1998	9	26,569	2,952
1997	14	11,520	823
1996	31	45,945	1,482
1995	6	3,685	614
1994	8	13,870	1,734
1992	3	10,864	3,621
total	**301**	**1,053,844**	**3,501 (average)**

Category 5. Invasive annual grasses

Medusahead infests more than 300,000 acres[30] on the district (Table 2-5). On the majority of these acres, desirable native perennial species are also present. The district has conducted an analysis utilizing mapped medusahead infestations and soils identified as having characteristics known to support medusahead, and identified areas vulnerable to medusahead infestation (see Map 2-7). This analysis identifies 886,424 acres (27 percent of the district) at risk.

Cheatgrass is found throughout the Burns district, and there are few locations where cheatgrass does not occur (Table 2-5). Density varies from low to high, with some areas of the district at greater risk for problematic levels of cheatgrass and other invasive annual grasses (including medusahead and ventenata).

Table 2-5. Invasive Annual Grasses

Common Name *Scientific Name*	Number of sites *Documented Acres*	Estimated Acres[1]	Common Habitat	Table 2-10 (*Treatment Key*) Species Group
Medusahead Rye *Taeniatherum caput-medusa*	452 sites *106,627 acres*	300,000 acres	Rangeland, ROW	Annual Grasses[2]
Cheatgrass / Downy brome *Bromus tectorum*	12 sites *7,855 acres*	500,000 acres	Rangeland, ROW	
Ventenata / North Africa grass *Ventenata dubia*	12 sites *15 acres*	50,000 acres	Rangeland with ephemeral standing water	

1. The district has specifically identified Medusahead management blocks containing an estimated 300,000 acres needing control. Similarly, fire management planning has identified cheatgrass and other invasive annual grasses as a fuels problem or potential problem on approximately 500,000 acres. See discussion under the Proposed Action, Category 5, in this chapter.
2. Only 197,740 acres of invasive annual grasses would likely be treated under the No Action Alternative. See Map 2-8, *Post-2010 Projects Treated Under the No Action Alternative*, for those locations. (Few other acres of invasive annual grasses may be treated in other areas with the non-selective herbicide glyphosate.)

Category 6. Lower priority invasive plants

Additional invasive plants (other than those associated with the above five categories) are known on the district but are generally not inventoried because they are a low priority for treatment, based on their apparent lower level of threat to natural resources (see Table 2-6). Noxious weeds are not included in this category.

Table 2-6. Low Priority Invasive Plants

Common Name	Scientific Name	Table 2-10 (*Treatment Key*) Species Group
Blue mustard	*Chorispora tenella*	Mustards
Bur Buttercup	*Ceratoephala testiculata*	Annual Broadleaves
Clasping pepperweed	*Lepidium perfoliatum*	Mustards
Common mullein	*Verbascum thapsus*	Thistles (annual and biennial)

[30] Actual acres are unknown. Few resources have been devoted to a complete mapping of these grasses because there were no herbicides selective to these grasses available to the BLM in Oregon until 2010.

Common Name	Scientific Name	Table 2-10 (*Treatment Key*) Species Group
Common teasel	*Dipsacus follonum*	Teasel
Curly Dock	*Rumex crispus L.*	Curly Dock
Desert madwort	*Alyssum desertorum*	Annual Broadleaves
Lambsquarters	*Chenopodium album* L. var. album	Annual Broadleaves
Prickly lettuce (and other lactucas)	*Lactuca serriola*	Annual Broadleaves
Russian thistle	*Salsola kali* L	Thistles (annual and biennial)
Tumble mustard (and other invasive annual mustards)	*Sisymbrium altissimum* L.	Mustards
Yellow alyssum	*Alyssum alyssoides*	Annual Broadleaves

The No Action Alternative - Noxious Weed Management

Introduction

The No Action Alternative would continue to implement the EA and Decision for the *Noxious Weed Management Program Environmental Assessment* for the Burns District (USDI 1998), consistent with the district Resource Management Plans and constrained by the Standard Operating Procedures, Mitigation Measures, and Conservation Measures listed in Appendix A.

Under this alternative, the district would also continue to implement invasive plant control described in eight recent EAs (and one Documentation of NEPA Adequacy (DNA) tiered to these EAs) tiered to the 2010 Oregon FEIS, one each for the Happy Valley and Pine Creek Allotment Management Plans, one for Alder Creek Restoration, and five for emergency stabilization and / or rehabilitation for specific wildfires (Map 2-8 and Table 2-7). These documents include the same Standard Operating Procedures and other constraints listed above.

Treatment Sites and Priority Setting

Category 1, Existing documented sites, and ***Category 2, Spread from existing documented sites:*** Over the next 10 to 15 years, the district would expect to control documented noxious weed infestations on the 23,771 acres of documented sites (Category 1) and spread from those sites (Category 2), for which there are control tools available under this alternative.[31] Most of these treatments would be conducted using ground-based treatment methods. Although it is desirable to treat all of these acres as quickly as possible, past annual treatment levels in these two categories have been limited by funding and staffing to less than 3,000 acres per year (Table 2-8, Annual Treatment Summary).

[31] Of the 26,011 acres in Category 1 (Table 2-1), the No Action alternative does not include an herbicide or other control method effective on perennial pepperweed (2325 acres), St. John's wort (2 acres), or tamarisk (3 acres), and Russian Olive (10 acres) cannot be treated because it is not listed as a noxious weed.

Table 2-7. Summary of NEPA Covering the No Action Alternative

NEPA Authorizing Treatments[5]	Invasive Plant Treatments[1]	Potential Invasive Plant species	Proposed Treatment Acres		Location	Categories	Acres Treated With Herbicides		
			Net	Gross			2012	2013	2014
2015 Alder Creek Restoration Environmental Assessment (USDI 2015a)	Seeding and herbicides including imazapic, chlorsulfuron, and clopyralid	Medusahead and ventenata, Canada, Scotch and bull thistle	85.5 acres	7,187 acres	6.5 miles northeast of Crane	1,2,3,5	NA	NA	NA
2014 Gumboot Fire Emergency Stabilization and Rehabilitation Plan Determination of NEPA Adequacy (USDI 2014b)[2]	Seeding and herbicides including imazapic, chlorsulfuron, and clopyralid	Invasive annual grasses, Canada thistle, perennial pepperweed, white top, Mediterranean sage, Biennial thistles	13,000 acres (primarily medusahead some bull thistle) detected pre-fire.	70,000 acres	3 miles northeast of Riley	4	NA	NA	6,077
2014 Buzzard Complex Fire Emergency Stabilization and Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2014c)	Seeding and herbicides including imazapic, chlorsulfuron, clopyralid, and sulfometuron methyl	Invasive annual grasses, Canada thistle, perennial pepperweed, white top, Mediterranean sage, Biennial thistles	Aerial seeding on 29,729 acres; drill seeding on 8,678 acres; 764 acres of invasive plants not including tens of thousands of acres of invasive annual grasses	70,163 acres	45 miles northeast of Burns	4	2,979[3]	1,704[3]	247[4]
2013 Pine Creek Allotment Management Plan Environmental Assessment and Decision Record (USDI 2013a)	Seeding and herbicides including imazapic, chlorsulfuron, and clopyralid	Medusahead rye, cheatgrass, mustards, thistles, Canada thistle, knapweeds	1,500 acres	20,193 acres	30 miles east of Burns	1,2,3, and 5	NA	0	0
2013 Holloway Fire Emergency Stabilization and Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2013b)	Seeding and herbicides including imazapic, chlorsulfuron, and clopyralid	Cheatgrass, mustards, thistles, knapweed	20,000 acres	64,900 acres	Southeast Andrews RA (Fire started in NV)	4	NA	NA	3,807

NEPA Authorizing Treatments[5]	Invasive Plant Treatments[1]	Potential Invasive Plant species	Proposed Treatment Acres		Location	Categories	Acres Treated With Herbicides		
			Net	Gross			2012	2013	2014
2012 Miller Homestead Emergency Stabilization and Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2012b)	Seeding and herbicides including imazapic, chlorsulfuron, and clopyralid	Invasive annual grasses, Canada thistle, perennial pepperweed, white top, Mediterranean sage, Biennial thistles	60 acres, not including ~30,000 acres of annual grass	146,798 acres	12 miles west of Frenchglen	4	NA	697	5,035
2012 DSL and Smyth Creek Fires Emergency Stabilization and Rehabilitation Plans Environmental Assessment and Decision Record (USDI 2012c)	Seeding and herbicides including imazapic, chlorsulfuron, and clopyralid	Medusahead, mustards, thistles, and knapweeds	Seeding on 260 acres; herbicide on 10,000 acres	149,549 acres	Northern Steens Mountain (6 and 22 miles NE of Diamond)	4	2,455	354	1,059
2011 Happy Valley Allotment Management Plan Environmental Assessment and Decision Record (USDI 2011a)	Seeding and imazapic	Medusahead rye	300 acres of seeding; 5,000 acres of herbicide treatment.	16,785 acres	50 miles southeast of Burns	5	0	0	395
2011 Lamb Ranch Fire Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2011b)	Seeding and imazapic herbicide	Medusahead	Seeding on 224 acres		50 miles NE of Burns	4	294	0	0
1998 Noxious Weed Management Program Environmental Assessment and Decision Record (USDI 1998)	Full range of integrated weed management, including 2,4-D, glyphosate, picloram, and dicamba	Noxious weeds (*see Table 2-1*)	approximately 30,000 acres (as of 1998)	3.7 million acres	Entire District (Three Rivers and Andrews / Steens Resource Areas)	1, 2, 3 some 4	3,106	995	3,035

1. Only invasive plant treatments listed. Other vegetation treatments may be authorized.
2. Tiers to the 2013 Holloway Fire Emergency Stabilization and Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2013b) and the 2012 Miller Homestead Emergency Stabilization and Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2012b).
3. Treated under the Bartlett Mountain Emergency Stabilization and Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2012d). This area re-burned in 2014 and is now covered by the 2014 Buzzard Complex Fire Emergency Stabilization and Rehabilitation Plan Environmental Assessment and Decision Record (USDI 2014c)
4. Treated in calendar year 2014, fiscal year 2015.
5. Two other EAs tiered in part on the 2010 Oregon EIS and proposing the use of herbicides additional to the currently authorized four, one for Alvord Allotment Management Plan and one for Bone Creek Basin Fire Emergency Stabilization and Rehabilitation, were begun in April and October 2014 respectively. These two EAs are on hold pending completion of this EA, and invasive plant control treatments proposed in those two EAs are wholly included within the acreage estimates and analysis for the Proposed Action in this EA.

Consistent with the priorities described in the Steens Mountain CRMP Resource Management Plan, invasive plant control on disturbed areas such as roads, rights-of-ways, waterholes, and recreational sites will be emphasized (USDI 2005b:33). Approximately half of the treatments in a given year are re-treatments of areas treated previously (USDI 2010a:136).[32] These follow-up treatments are more likely to include pulling or other manual treatments as the population at a given site is reduced or is made up of seedlings from a remaining seed bank. General priorities for selecting annual treatments are described in the *Planning* section under *Background-Invasive Plant Management* earlier in this Chapter. The treatment goal is eradication or control of invasive plants at a level where they are not adversely impacting desired resource values.

Table 2-8. Annual Treatment Summary

Year	Acres Monitored[6]	Acres Inventoried[6]	Herbicide Treatment Acres				Manual and Mechanical Acres	Prescribed Fire	Biocontrol Releases[4]	Targeted Grazing	Seeded for Invasive Plant Management[5]	
			1998 NEPA[1]		Post 2010 NEPA[2]							
			Total	Air[3]	Total	Air[3]					Sites	Acres
2014	NA	NA	3,035	0	16,226	14,296	10	0	1	11,318[7]	63	5,416
2013	139,671	31,105	995	0	2,755	2,058	10	0	1	100 + 10,568[7]	87	32,286
2012	99,796	2,720	3,106	0	7,921	7,921	10	0	7	260 + 11,318[7]	36	4,295
2011	219,078	4,500	2,922	0	NA	NA	10	0	2	260	35	3,928
2010	115,603	17,211	1,438	0	NA	NA	10	0	2	260	14	2,348
2009	137,489	16,987	1,058	0	NA	NA	10	0	3	260	19	3,494
2008	64,950	36,600	2,026	1,340	NA	NA	10	0	3	165	50	17,281
2007	49,626	37,500	1,895	1,320	NA	NA	10	0	3	225	19	26,154
2006	9,010	25,300	488	0	NA	NA	10	0	3	225	7	9,610
2005	8,350	41,000	619	0	NA	NA	60	0[8]	0	225	9	3,462
2004	5,000	23,000	517	0	NA	NA	112	0	1	225	2	1,735

1. Treatments done under the 1998 Noxious Weed Management Program EA, and herbicides may include 2,4-D, dicamba, glyphosate, or picloram.
2. Treatments done under emergency stabilization and rehabilitation and allotment management NEPA completed after the 2010 Oregon FEIS Record of Decision was signed. Herbicides may include imazapic, chlorsulfuron, clopyralid, or sulfometuron methyl (see Table 2-7).
3. Aerial acreage is included in total.
4. One biocontrol release is counted as treating one acre. However, biocontrols may not spread to an entire acre or may spread much further than one acre. This lists new releases.
5. Seeding for various objectives (including invasive plant management) is analyzed in other EAs.
6. Areas are inventoried for invasive plants. If invasive plants found, acres are treated (if possible) and monitored for re-growth and spread in subsequent years.
7. All in the Upton Mountain Allotment. Includes fall / winter grazing on invasive annual grasses on the Upton Mountain pasture (7,771 acres) in 2012, 2013, and 2014; early spring grazing (April) for invasive annual grass control and fuels management on the North Bartlett Pasture (3,547 acres) in 2012 and 2014; and, early spring grazing (April) for invasive annual grass control and fuels management on the South Bartlett Pasture (2,797 acres) in 2013.
8. A forty acre treatment in a wetland area with prescribed fire was considered in 2005.

Category 3, New invaders: Treatment scenarios for watch list species are included in the Treatment Key (see Table 2-10 near the end of this Chapter). For other, currently unknown Category 3 species, treatments will generally follow the treatment scenarios described for related invasive species.

Category 4, Post-fire emergency stabilization and rehabilitation areas: Hoary cress, thistles, and other Category 1 species can rapidly invade newly burned areas, inhibiting efforts to reestablish desirable vegetation. These species may be treated using treatment methods and herbicides described in the 1998 Burns District Noxious Weed Management EA.

[32] Some species are killed with a single herbicide application while other species may only be suppressed, and are treated to keep them from setting seed or expanding. Larger sites often have a seed bank that keeps them returning on the same site for several to many years.

In addition, control of invasive annual grasses and other species would occur as described in post-2010 EA and DNA documents listed on Table 2-7, using additional herbicides made available by the 2010 Oregon FEIS (mostly imazapic). Under these analyses, a multi-year total of tens of thousands of acres of invasive annual grasses may be treated depending upon the threat indicated by annual monitoring of these areas.[33] The Holloway Emergency Stabilization and Rehabilitation EA, for example, estimates such treatments could be needed on approximately 15,000 acres within the 64,900 acre fire perimeter[34] and a four mile buffer (USDI 2013a:22-23).

Category 5. Invasive annual grasses: With the exception of the eight analysis areas listed on Table 2-7, no herbicide or other treatment method is available for selectively treating the invasive annual grasses. In general, the tools (including herbicides) available on the rest of the district under the No Action Alternative are poorly suited for accomplishing most management objectives in this category. Medusahead would occasionally be controlled with glyphosate where protecting associated species is not a concern.

Category 6. Lower priority invasive plants: Plants in this category would not normally be treated except in conjunction with treatments of other plant species on the same site, or if they begin to threaten native ecosystems. Because these are not noxious weeds, they would not be treated with herbicides.

The Herbicides

Control efforts would use a variety of treatment methods including the four herbicides available across the district under this alternative, 2,4-D, picloram, dicamba, and glyphosate (Table 2-9). Control efforts in the eight recent analysis areas listed on Table 2-7 would use the additional herbicides chlorsulfuron, clopyralid, sulfometuron methyl, and / or imazapic for invasive plant control.[35]

Selection of the Treatment Method

Working within the priorities and constraints described in the *Planning* section under *Background – Invasive Plant Management* earlier in this Chapter, the identification of what treatment to use and, where applicable, the actual herbicide to be used, would follow the criteria presented in the Treatment Key (Table 2-10), and be limited to the herbicides described in their respective NEPA documents.

Treatments on the Treatment Key (Table 2-10) are listed by preferred treatment method first, followed by second and third choices and so on in priority order, with selection based primarily on the factors listed on the table. The percent of time each choice would be used has been estimated, based on current information about documented invasive plant sites. Herbicide mixes, or second or third choice treatments, are also used for follow-up treatments to control plants surviving previous treatments. Where treatments sites are near water bodies, an aquatic herbicide formulation may be specified to meet site protection objectives. Otherwise, second or third choice treatments would be used as dictated by the soil, season, and other criteria included in Table 2-10, or when Standard Operating Procedures, Mitigation Measures, Best Management Practices, or Conservation Measures (Appendix A) preclude the use of the first choice because of the presence of humans, livestock, or other resources that would be put at risk by the first choice. For example, a Mitigation Measure precludes the use of 2,4-D in wild horse Herd Management Areas (HMAs) during peak foaling season (March through June, and especially in May and June)(see Appendix A).

[33] Table 2-8 shows recent invasive annual grass treatments, but herbicides selective to invasive annual grasses have only recently become available, so past annual treatments likely do not reflect future funding, and certainly do not meet the need.
[34] The wildfire also burned on the Vale District and in Nevada; these numbers are only for the Burns portion of the fire.
[35] Additional herbicides are included in some of these EAs for vegetation control and fire protection around power poles. Since those treatments have objectives beyond invasive plant control or use herbicides not analyzed in this EA, they are not considered part of the No Action Alternative described in this EA.

Table 2-9. Herbicide Information

Dark background indicates that the herbicide is available for use on noxious weeds district-wide under the No Action Alternative.
Light background indicates that the herbicide may be available for use on invasive plants in limited areas under the No Action Alternative (see EAs on Table 2-7 and Map 2-8).
All 14 herbicides are available for use district-wide 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[14]**	**Areas Where Registered Use is Appropriate**							**Application Rate (lbs. / acre / year)** Typical *Max[2]*	**Aerial Spray[12]**	**Half-life in Soils (days)**
			Rangeland	*Forest and Woodland*	*Riparian / Seasonal Wetland*	*Aquatic / Wetland*	*Geothermal, Oil, Gas, & Mineral Material 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 nontarget 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 washwaters.	√	√	√	√	√	√	√	1 *(1.9)*	Yes	10
Chlorsulfuron[3]: Telar. Often used in combination with 2,4-D. *Thistles, perennial mustards, toadflax, tansy ragwort, 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[8]*	Restricted [5]	40
Clopyralid[3,4]: Transline, Stinger, Spur. Often used in combination with 2,4-D. *Knapweed, Mediterranean sage, 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[14]**	**Areas Where Registered Use is Appropriate**							**Application Rate (lbs. / acre / year)** Typical *Max[2]*	**Aerial Spray[12]**	**Half-life in Soils (days)**
			Rangeland	*Forest and Woodland*	*Riparian / Seasonal Wetland*	*Aquatic / Wetland*	*Geothermal, Oil, Gas, & Mineral Material Sites*	*Rights-of-Way*	*Recreation & Cultural Sites*			
Dicamba: Vanquish, Banvel, Diablo, Vision, Clarity *Used in combination with 2,4-D to control perennial mustards, thistles, field bindweed, halogeton, and 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), 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 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[10]*	Yes	14
Diflufenzopyr + Dicamba: Overdrive, Distinct *Field bindweed, halogeton, and St John's wort*	**broadleaf** Post *Foliar*	– Do not load, mix, or apply within 50 feet of wells. – Do not apply directly to water, where surface water is present, or to intertidal areas. Do not contaminate water when disposing of equipment washwaters. – Do not apply to impervious substrates or under conditions that favor runoff. Do not apply to soils classified as sand. – Be cognizant of leaching where soils are permeable or where water table is shallow.	√				√	√	√	0.2625 *0.4375*	No	14
Fluridone: Avast!, Sonar *Aquatic plants*	**submersed plants** Post *Aquatic*	– Consult local State fish and game agency and water control authorities before applying this product to public water. Permits may be required. – Do not apply in tidewater / brackish water.				√				0.15 *(1.3)*	Yes	21
Glyphosate[3]: Many, including Rodeo, Mirage, Roundup Pro, and Honcho *Grasses, broadleaf plants, woody species*	**no** Post *Soil or foliar*	– 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 invasive plants can result in oxygen depletion	√	√	√	√	√	√	√	2 *4 or 7[7, 13]*	Restricted[9]	47

Herbicide: Representative Trade Names[1] *Common Targets*	**Selective to Plant Types** Pre / post emergent *Point of application*	**General Constraints From Label[14]**	**Areas Where Registered Use is Appropriate**							**Application Rate (lbs. / acre / year)** Typical *Max[2]*	**Aerial Spray[12]**	**Half-life in Soils (days)**
			Rangeland	*Forest and Woodland*	*Riparian / Seasonal Wetland*	*Aquatic / Wetland*	*Geothermal, Oil, Gas, & Mineral Material Sites*	*Rights-of-Way*	*Recreation & Cultural Sites*			
		or loss due to decomposition of plants that can cause fish suffocation. – Avoid drift.										
Hexazinone: Velpar *Annual grasses in rights-of-way*	**grasses, broadleaf, woody plants** Pre and 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. – Use care where soils are permeable to avoid groundwater contamination.	√	√			√	√	√	2 *(4[13])*	Restricted[9]	90
Imazapic[3]: Plateau, Panoramic *Annual grasses such as medusahead, 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
Imazapyr[3]: Arsenal, Stalker, Habitat, Polaris *Starthistles, Russian olive, and saltcedar*	**no** Pre and post *Soil or foliar*	– Do not apply non-aquatic formulation 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.	√	√	√	√	√	√	√	0.45 *1.25[10]*	Yes	25-141
Metsulfuron methyl[3]: Escort, Patriot, PureStand. Often used in combination with 2,4-D. *Halogeton, houndstongue, perennial mustards, St. John's wort, and thistles*	**broadleaf, woody plants** 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. – This herbicide is injurious to plants at extremely low concentrations. Nontarget plants may be adversely affected from drift and run-off.	√	√	√		√	√	√	0.03 *0.15[6,10]*	Restricted[5]	30

Herbicide: Representative Trade Names[1] *Common Targets*	**Selective to Plant Types** Pre / post emergent *Point of application*	**General Constraints From Label[14]**	**Areas Where Registered Use is Appropriate**							**Application Rate (lbs. / acre / year)** Typical *Max[2]*	**Aerial Spray[12]**	**Half-life in Soils (days)**
			Rangeland	*Forest and Woodland*	*Riparian / Seasonal Wetland*	*Aquatic / Wetland*	*Geothermal, Oil, Gas, & Mineral Material Sites*	*Rights-of-Way*	*Recreation & Cultural Sites*			
Picloram[3]: Triumph, OutPost, Tordon. Often used in combination with 2,4-D. *Field bindweed, houndstongue, knapweed, St. John's wort, starthistles, tansy ragwort, and 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. Nontarget 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
Sulfometuron methyl[3]: Oust, Spyder *Annual grasses*	**no** Pre and 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. – Applications to powdery, dry soil when there is low likelihood of rain soon may result in off-site damage by wind-borne soil particles. – Do not treat frozen soil. – Do not apply in or on irrigation ditches or canals, including their outer banks.		√	√		√	√	√	0.14 *0.38*	No	20
Triclopyr[3]: Garlon, Renovate, Element *Purple loosestrife, Russian olive, and saltcedar*	**broadleaf, woody plants** Post *Foliar*	– Consult local State fish and game agency and water control authorities before applying this product to public water to determine if a permit is needed. – Treatment of aquatic invasive plants can result in oxygen depletion or loss due to decomposition of plants in certain situations, which can cause fish suffocation. – Certain approved products can be used in and around standing water sites. Minimize overspray to open water (streams, lakes, etc) when treating vegetation growing at water's edge. Do not contaminate water when disposing of equipment wash-water.	√	√	√	√	√	√	√	1 *(10^{13})*	No[11]	46

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 BLM Lands 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. These, and sethoxydim, are approved for use by the U.S. Forest Service in Oregon and Washington (USDA 2005b).
4. 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."
5. Only allowed when no other means of application are possible.
6. Metsulfuron methyl is limited to a maximum rate of 0.0625 lbs. per acre on rangeland.
7. The maximum application rate for glyphosate is 4 lbs. / acre for the No Action Alternative and 7 lbs. / acre under the Proposed Action.
8. Do not apply more than 0.0611 lbs. / acre per year in pasture or rangeland.
9. PEIS Mitigation Measures include "where practical, limit glyphosate and hexazinone 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 to spot applications in rangeland"
10. 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, imazapyr, and metsulfuron methyl at the typical, rather than maximum, application rate to minimize risks."
11. A Human Health and Safety mitigation measure selected by the Oregon Record of Decision says, "do not apply triclopyr by any broadcast method."
12. Conservation Measures (see Appendix A) provide additional restrictions near Special Status species.
13. PEIS Mitigation Measures specify "Minimize potential risks to livestock by applying glyphosate at the typical application rate where feasible" and "Minimize potential risks to wild horses and burros by applying glyphosate, hexazinone, and triclopyr at the typical application rate, where feasible, in areas associated with wild horse and burro use."
14. Not all label requirements are listed. All label requirements are followed.

Table 2-10. Treatment Key[1] (treatments ordered by preferred treatment method)

Dark background indicates that the treatment method is available for use on noxious weeds district-wide under the No Action Alternative.
Light background indicates that the herbicide is available for use on invasive plants in limited areas under the No Action Alternative (see EAs on Table 2-7 and Map 2-8).
All treatment methods are available for use district-wide on invasive plants under the Proposed Action.

For each species group, the preferred treatment method is listed first, with second and third choices (and so on) listed subsequently. Factors that could lead to the preferred (and subsequent) methods not being appropriate are listed in the *Treatment Considerations / Notes* column, and includes information such as plant life cycle, soil types, plant resistance to herbicides, infestation size, herbicide selectivity to neighboring desirable vegetation, weather conditions, and standard operating procedures or label restrictions that limit areas an herbicide could be used in.
In addition to treatments shown on the *Treatment Key*, targeted grazing (with goats, sheep, or cattle) or prescribed fire may be used on Category 1 and 2 species. This would happen rarely, on the order of a few times a decade.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
African rue [3]	Imazapyr	2 qt.	1	Unknown[5]	Unknown[5]	African rue is documented on neighboring lands, but not known to occur on the Burns District
	Sulfometuron methyl	3 to 8 oz.	0.14 to 0.38	Unknown[5]	Unknown[5]	
Annual Broadleaves *(unknown)* [1,2,4,6]	Manual control			<1%	<1%	Annual broadleaves can be controlled through hand pulling if infestations are small.
	Mechanical control			10%	99%	Annual broadleaves can be controlled with mowing, but can adversely affect desirable neighboring species.
	Chlorsulfuron + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.047 + 0.475 to 0.95	45%	0%	Preferred herbicide treatment. Annual broadleaves can develop resistance, especially to sulfonylureas[5].
	Metsulfuron methyl + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.0375 + 0.95	4%	NA	Treatments can adversely affect desirable wet-meadow grass species.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Dicamba + Diflufenzopyr ("Overdrive")	8 oz.	0.35	20%	NA	Treatment along roads or disturbed areas.
	2,4-D + Dicamba	1 qt. + 1 pt.	0.95 + 0.5	20%	0%	Treatment has minimal residual control.
Annual Grasses *(850,000 acres[8])* [4,5]	Imazapic	6 oz.	0.09	90%	97%	Preferred treatment at the pre-emergent stage when other grasses and forbs are dormant in the Fall.
	Imazapic + Glyphosate	6 oz. + 8 oz.	0.09 + 0.14	<1%	<1%	Effective treatment if some germination has started, but will adversely affect nearby vegetation.
	Glyphosate	1 qt.	1	<1%	2%	Apply at seedling stage. Will adversely affect nearby vegetation.
	Sulfometuron methyl	0.75 to 1.5 oz.	0.035 to 0.07	<1%	0%	Treatments will not affect perennial grasses (advantage in re-vegetation), but will adversely affect forbs. Sulfometuron methyl cannot be aerially sprayed or applied on rangeland
	Hexazinone	1.5 qt.	0.75	<1%	NA	Primarily for use on road rights-of-way. Could be used on rangelands.
	Sulfometuron methyl + Chlorsulfuron ("Landmark")	1.5 oz.		<1%	0%	Non-selective treatment. May be used when rangeland has become severely infested with invasive plant species. Has a 12-month grazing restriction and 12 month re-plant interval.
	Targeted grazing (cattle, goats, or sheep)			5%	5%	Grazing would be used in conjunction with herbicide treatments. Typical grazing treatments occur in the late fall / early winter or early spring to reduce the seeds and production of annual grasses.
Aquatic Plants [3]	Manual control			Unknown[1]	Unknown[1]	The preferred treatment is plant and location specific. Invasive aquatic plants are not currently known on the District.
	Aquatic Glyphosate	1 qt.	1	Unknown[1]	Unknown[1]	
	Fluridone	1 qt.	1	Unknown[1]	Unknown[1]	
	Triclopyr	8 qt.	6	Unknown[1]	Unknown[1]	
	Imazapyr	1 qt.	0.5	Unknown[1]	Unknown[1]	
Curly Dock [4,6]	2,4-D + Chlorsulfuron + Dicamba	1 qt. + 1 oz. + 1 qt.	0.95 + 0.047 + 1	50%	NA[6]	Preferred treatment in rangelands.
	Metsulfuron methyl + 2,4-D + Dicamba	1 oz. + 1 qt. + 1 qt.	0.0375 + 0.95 +1	45%	NA	Preferred treatment near roads.
	Dicamba + Diflufenzopyr ("Overdrive")	8 oz.	0.35	5%	NA	Use for smaller plants. Higher rates can treat larger plants, but will adversely affect grasses.
Field Bindweed *(5 acres)* [1,2,4]	Manual control			<1%	<1%	Hand pulling can be effective on seeding or young adults but is not effective when the plant has developed a deep, extensive system.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Dicamba + Diflufenzopyr ("Overdrive")	8 oz.	0.35	25%	NA	Preferred treatment in disturbed areas, particularly on roadsides.
	Metsulfuron methyl + 2,4-D[11]	1.0 oz. + 1 pt. to 1 qt.	0.0375 + 0.475 to 0.95	40%	NA	Apply from seedling to flowering stage.
	Picloram + 2,4-D	1 qt. + 1 qt.	0.5 + 0.95	9%	19%	Apply from seedling to early bloom.
	2,4-D + Dicamba	1 qt. + 1 pt.	0.95 + 0.5	20%	80%	Apply from seedling to flowering stage.
	Aquatic Glyphosate	1.5% solution (2 oz. / gallon)	minimal (0.02lbs / gallon)	5%	0%	Would be used where treatments might contact water.
Halogeton *(54 acres)* [1,2,4]	Manual control			<1%	<1%	Hand pulling is effective for small infestations.
	Dicamba + Diflufenzopyr ("Overdrive")	8 oz.	0.35	10%	NA	Preferred herbicide treatment. Use where resistance to sulfonylureas[5] is a concern and / or to prevent seed formation / set is needed.
	Chlorsulfuron + 2,4-D[11]	1.3 oz. + 1 pt. to 1 qt.	0.0611+ 0.475 to 0.95	49%	0%	Apply from rosette to flowering stage, where soils are not sandy or gravelly, and where treatments are within labeled distances from water or wells.
	2,4-D + Dicamba	1 qt. + 1 qt.	0.95 + 1		99%	Apply from rosette to flowering stage.
	Metsulfuron methyl + 2,4-D[11]	1.5 oz. + 1 pt. to 1 qt.	0.05625 + 0.475 to 0.95	40%	NA	Treat at Spring and Fall rosette stage to take current year's growth.
Hemlock *(unknown)* [1,2,4]	Manual control			0%	0%	Toxic to touch.
	Imazapyr	1 qt.	0.5	10%	NA	Non-selective. Apply pre-emergence or in the rosette stage. Preferred treatment where plants are growing in the water. Prevents seed-set.
	2,4-D + Chlorsulfuron	1 qt. + 1 oz.	1.9 + 0.047 0.06675	65%	0%	Treat marshes, swamps and bogs after water has receded as well as seasonally dry flood deltas. (Do not make application to waterbodies.)
	Metsulfuron methyl	1.78 oz.	0.06675	10%	NA	Treat marshes, swamps and bogs after water has receded as well as seasonally dry flood deltas. (Do not make application to waterbodies.)
	Aquatic Glyphosate or 2,4-D	2 qt. or 1 qt.	2 or 0.95	10%	100%	Use where treatments could contact water.
	Dicamba + 2,4-D + Metsulfuron methyl	1 pt. + 2 qt. + 0.5 oz.	0.5 + 1.9 + 0.01875	5%	NA	Appropriate for rights-of-way
Houndstongue *(96 acres)* [1,2,4]	Manual control			<1%	<1%	Hand pulling is feasible for scattered plants or for areas where other control methods are not feasible. Manual control will be limited to small infestations.
	Chlorsulfuron + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.047 + 0.475 to 0.95	90%	0%	Apply to prevent seed formation / set or where resistance to sulfonylureas[5] is a concern.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Metsulfuron methyl + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.0375 + 0.475 to 0.95	<1%	NA	Apply to prevent seed formation / set or where resistance to sulfonylureas[5] is a concern. Less expensive than chlorsulfuron but will adversely affect wet meadow grass species.
	Picloram + 2,4-D	1 qt. + 1 qt.	0.5 + 0.95	3%	85%	Apply from rosette to flowering stage. Use where there are seed banks and where soils are not sandy or gravelly, where treatments are within labeled distances from water or wells, and where adverse impacts to desirable vegetation can be minimized.
	Aquatic Glyphosate or 2,4-D	1.5% solution (2 oz. / gallon)	minimal (glyphosate: 0.02lbs / gallon; 2,4-D: 0.03lbs / gallon)	5%	14%	Appropriate where treatments could contact water.
Knapweed (Diffuse and Spotted) *(525 acres)* [1,2,3,4]	Manual control			<1%	<1%	Hand pulling is feasible for scattered plants or for areas where other control methods are not feasible. Manual control will be limited to small infestations. Retreatment will be needed up to 3 times a year.
	Biological controls			5%	9%	Two biological controls are active against diffuse and spotted knapweed on the District. Will only be used on large uncontrollable infestations.
	Clopyralid + 2,4-D[11]	1 pt. + 1 pt. to 1 qt.	0.375 + 0.475 to 0.95	70%	20%	Apply from rosette to flowering stage. Late season application offers residual control (killing Fall rosettes and inhibiting seedling growth the following year).
	Picloram + 2,4-D	1 qt. + 1 qt.	0.5 + 0.95	20%	65%	Apply from rosette to flowering. Late season application offers residual control (killing Fall rosettes and inhibiting seedling growth the following year). Appropriate at sites where soils are not sandy or gravelly.
	Aquatic Glyphosate	1.5% solution (2 oz. / gallon)	minimal (0.02lbs / gallon)	4%	5%	Apply from rosette to flowering. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized. Use where treatments could contact water.
Mediterranean sage *(647 acres)* [1,2,4]	Manual control			<1%	<1%	Can be controlled through hand pulling or digging if infestations are small.
	Chlorsulfuron + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.047 + 0.475 to 0.95	90%	60%	Preferred treatment. Use to prevent seed formation / set or where resistance to sulfonylureas[5] is a concern.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Metsulfuron methyl + 2,4-D[11]	1.7 oz. + 1 pt. to 1 qt.	0.06375 + 0.475 to 0.95	<1%	NA	Apply from rosette to flowering. Use to prevent seed formation / set or where resistance to sulfonylureas[5] is a concern. Less expensive than chlorsulfuron + 2,4-D.
	Picloram + 2,4-D	1 qt. + 1 qt.	0.5 + 0.95	<1%	35%	Use when seed bank is extensive.
	Clopyralid	1.33 pt.	0.5	<1%	0%	Apply from rosette to flowering. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized.
	Clopyralid + 2,4-D	4 qt.	0.75 + 1.9	5%	0%	Treatment when plants have bolted.
	Aquatic Glyphosate or 2,4-D	1.5% solution (2 oz. / gallon)	minimal (glyphosate: 0.02lbs / gallon; 2,4-D: 0.03lbs / gallon)	<1%	4%	Use where treatments could contact water.
Mustards *(5,201 acres)* [1,2,4,6]	Chlorsulfuron	1.3 oz.	0.0611	10%	5%	Most effective at flowering stage; also effective from the bud to soft dough stage. Useful when Canada thistle occurs in the infestation mix. (Rotate with metsulfuron methyl to prevent resistance.)
	Metsulfuron methyl	1.78 oz.	0.06675	<1%	NA	Most effective at flowering stage; also effective from the bud to soft dough stage. Useful when Canada thistle occurs in the infestation mix. (Rotate with chlorsulfuron to prevent resistance.)
	Chlorsulfuron + 2,4-D[11]	1.3 oz. + 1 pt. to 1 qt.	0.0611 + 0.475 to 0.95	50%	50%	Apply where resistance to sulfonylureas[5] is a concern. Proximity to water needs to be considered for the product choice. Will halt seed production on Dyer's Woad.
	Metsulfuron methyl + 2,4-D[11]	1.78 oz. + 1 pt. to 1 qt.	0.06675 + 0.475 to 0.95	20%	NA	Apply where resistance to sulfonylureas[5] is a concern. Proximity to water needs to be considered for the product choice.
	2,4-D + Dicamba	1 qt. + 1 pt.	0.95 + 0.5	14%	40%	Use in meadows where susceptible grasses are the main desirable species.
	Aquatic Glyphosate or 2,4-D	1.5% solution (2 oz. / gallon)	minimal (glyphosate: 0.02lbs / gallon; 2,4-D: 0.03lbs / gallon)	5%	5%	Would be used where treatments could contact water.
Puncturevine	Manual control			5%	5%	Effective control for small infestations.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories] *(8 acres)* [1,2,4]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Chlorsulfuron + 2,4-D[11]	1.3 oz. + 1 pt. to 1 qt.	0.0611 + 0.475 to 0.95	80%	0%	Apply where resistance to sulfonylureas[5] is a concern. Proximity to water needs to be considered for the product choice.
	2,4-D + Dicamba	1 qt. + 1 qt.	0.95 + 1.0	15%	95%	Will control current year's growth if treatment occurs prior to seed formation. Does not provide any residual control.
Purple loosestrife *(less than 1 acre)* [1,2,4]	Manual control			<1%	<1%	Can be used on small infestations.
	Triclopyr	6 qt.	4.5	90%	NA	Preferred treatment. Use aquatic formulations. It can be used at all stages but primarily at the flowering stage to ensure proper identification.
	Aquatic Glyphosate	1.5% solution (2 oz. / gallon)	minimal (0.02lbs / gallon)	9%	99%	It can be used at all stages but primarily at the flowering stage to ensure proper identification. This is a non-selective product and care should be taken to avoid treating desirable vegetation.
Ragwort, Tansy *(less than 1 acre)* [1,2,4]	Manual control	Hand Pulling		<1%	<1%	With small infestations, hand pulling is feasible, especially when soils are moist (wear gloves).
	Chlorsulfuron + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.047 + 0.475 to 0.95	90%	2%	Apply to prevent seed formation / set or where resistance to sulfonylureas[5] is a concern.
	Metsulfuron methyl + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.0375 + 0.475 to 0.95	4%	NA	Apply to prevent seed formation / set or where resistance to sulfonylureas[5] is a concern. Is less expensive than chlorsulfuron but will adversely affect wet meadow grass species.
	Picloram + 2,4-D	1 oz. + 1 qt.	0.02 + 0.95	5%	97%	Apply from rosette to bud stage. Apply from rosette to flowering stage. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized .
Russian Knapweed and Perennial Thistles[9] *(7,811 acres)* [1,2,4]	Biological controls			10%	25%	Several biological controls are currently being used successfully to control Canada thistle on the District. Newer agents for Russian knapweed are in the County in limited quantities. Efficacy undetermined.
	Clopyralid	1.3 pt.	0.49	20%	5%	One of the preferred herbicide treatments, post-frost.
	Picloram	1 qt.	0.5	10%	20%	One of the preferred herbicide treatments, post-frost.
	Clopyralid + 2,4-D[11]	1.3 pt. + 1 pt. to 1 qt.	0.49 + 0.475 to 0.95	25%	5%	Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Picloram + 2,4-D	1 pt. + 1 qt.	0.25 + 0.95	20%	30%	Adding 2,4-D is helpful if treatment occurs at the bud to flowering stage.
	Aquatic Glyphosate	1.5% solution (2 oz. / gallon)	minimal (0.02lbs / gallon)	10%	10%	Would be used where treatments could contact water.
	Chlorsulfuron	1.3 oz.	0.0611	5%	5%	Can be used for Canada thistle at any stage.
St. John's wort *(2 acres)* [1,2,4]	Manual control			<1%	<1%	Only for very small infestations. Not effective control.
	Biological controls			84%	84%	Two St John's wort biological control agents are currently active on the District They are prominent and appear to be limiting expansion of this plant.
	Metsulfuron methyl + 2,4-D[11]	1.7 oz. + 1 pt. to 1 qt.	0.06375 + 0.475 to 0.95	5%	NA	Preferred treatment for large infestation in rangelands.
	Dicamba + Diflufenzopyr ("Overdrive")	8 oz.	0.35	<1%	NA	Primarily for use on roadsides
	Glyphosate	2 qt.	2	<1%	5%	Use aquatic formulations near water.
	Picloram + 2,4-D	1 qt. + 1 qt.	0.50 + 0.95	8%	10%	Apply from rosette to flowering. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized.
Starthistles *(7 acres)* [1,2,3,4]	Manual control			10%	10%	Effective control for small infestations.
	Clopyralid + 2,4-D[11]	1 pt. + 1 pt. to 1 qt.	0.375 + 0.475 to 0.95	50%	0%	Preferred treatment from seedling to bud where treatments are within labeled distances from water or wells.
	Clopyralid + Picloram	1 pt. + 1 qt.	0.375 + 0.5	0%	0%	Apply from rosette to flowering. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized.
	Picloram + 2,4-D	1 qt. + 1 qt.	0.50 + 0.95	40%	90%	Apply from rosette to flowering. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized.
	Imazapyr	1 qt.	0.5		NA	Apply when dormant or pre-emergent. Use where infestations occur near water.
Tamarisk and Russian Olive *(14 acres)* [1,2,4]	Mechanical control			5%	30%	Mowing can effectively control small plants.
	Imazapyr	2 qt.	1	75%	NA	Preferred treatment applied to actively growing foliage during flowering. Can be used on cut stumps. Use formulations labeled for aquatic use if treatments might contact water.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Triclopyr	Undiluted	<10	15%	NA	Works when applied as a cut stump treatment. Use formulations labeled for aquatic use if treatments might contact water.
	Glyphosate	3.3 qt.	3.3	5%	70%	Apply with cut stump or broadcast treatments would be made in late summer. Aquatic formulations would be used near water.
Teasel [4,6]	Manual control			<1%	NA[6]	With small infestation, digging or hand pulling before flowering are effective controls.
	Chlorsulfuron	1.3 oz.	0.0611	39%	NA	Apply post-emergence from rosette to bolting stage.
	Metsulfuron methyl	1 oz.	0.0375	5%	NA	Apply post-emergence from rosette to bolting stage.
	Clopyralid	1.33 pt.	0.5	5%	NA	Treatments effective for young plants.
	Aquatic 2,4-D	1.5% solution (2 oz. / gallon)	minimal (0.03lbs / gallon)	50%	NA	Apply to rosettes in Spring in wet situations.
Thistles (annual and biennial[10]) *(11,176 acres)* [1,2,3,4,6]	Manual control			<1%	<1%	Manual control can be effective in controlling existing plants, but will not be effective on the seed bank. Would only be used on small infestations.
	Chlorsulfuron	1 oz.	0.047	7%	4%	Preferred treatment at the rosette to bud stage. This treatment is particularly useful when Canada thistle occurs in the infestation mix.
	Metsulfuron methyl	1 oz.	0.0375	6%	NA	Apply at rosette to bud stage. Will adversely affect wet-meadow grass species.
	Clopyralid + 2,4-D[11]	1 pt. + 1 pt. to 1 qt.	0.375 + 0.475 to 0.95	10%	5%	Apply at the actively growing through flowering stages.
	Chlorsulfuron + 2,4-D[11]	1 oz. + 1 pt. to 1 qt.	0.75 + 0.475 to 0.95	5%	5%	Apply to prevent seed formation / set or where resistance to sulfonylureas[5] is a concern.
	Chlorsulfuron + Clopyralid + 2,4-D[11]	1 oz. + 1 pt. + 1 pt. to 1 qt.	0.047 + 0.375 + 0.475 to 0.95	50%	15%	Treat from rosette to flowering stage when there is an established seed bank at site.
	Chlorsulfuron + Picloram	1 oz. + 1 qt.	0.047 + 0.5	5%	5%	Apply from rosette to flowering. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized.
	2,4-D + Dicamba	1 qt. + 1 pt.	0.95 + 0.5	10%	38%	Apply at Spring and Fall rosette stage where no residual control is needed.
	Picloram + 2,4-D	1 pt. + 1 qt.	0.25 + 0.95	5%	25%	Apply from rosette to flowering. Use where there are seed banks, soils are not sandy or gravelly, treatments are within labeled distances from water or wells, and where adverse impacts to desirables can be minimized.

Species Group *(Cat. 1 or 5 Acres[2])* [Categories]	**Treatment Methods[1]**	**Formulated Product Per Acre**	**Lbs. / Acre[3]**	**How Often Treatment Would be Used[4]**		**Treatment Considerations / Notes[7]**
				Proposed	**No Action**	
	Aquatic Glyphosate	1.5% solution (2 oz. / gallon)	1	1%	2%	Would be used where treatments could contact water.
Toadflax *(467 acres)* [1,2,4]	Manual control			<1%	<1%	Hand pulling is only effective on seedlings before plants become established and the extensive root system develops.
	Biological controls			96%	96%	One effective biological control agent is active on toadflax in district. Other treatments would not happen unless it is a lone plant with no agents nearby.
	Chlorsulfuron	2 oz.	0.094	<1%	0%	Preferred application would be made post-emergence in the fall (typically after frost). Can also be used when plants are growing rapidly in the bud to bloom stage.
	Chlorsulfuron + 2,4-D[11]	1.3 oz. + 1 pt. to 1 qt.	0.0611 + 0.475 to 0.95	<1%	0%	Preferred application would be made post-emergence in the fall. Can also be used when plants are growing rapidly in the bud to bloom stage.
	Picloram + 2,4-D	1 qt. + 1 qt.	0.50 + 0.95	<1%	3%	Apply post-emergence when plants are growing rapidly.

NA: Not available under the No Action Alternative.
1. Many treatments are suggested by *Weed Treatments in Natural Areas in the Western United States* (DiTomaso et al. 2013) and the *Pacific Northwest Weed Management Handbook* (OSU 2009).
2. Invasive plant acres are unknown in Categories 2, 3, 4, and 6. See the Category descriptions earlier in this Chapter for more information.
3. Lbs. / acre of active ingredient or acid equivalent calculated from the rates per acre column, and can vary based on formulation. Typical and maximum application rates are listed on Table 2-9 (*Herbicide Information*).
4. Within each species group, and by alternative, these add up to 100 percent and show how often a treatment method would be used when a species is found. For example, under the proposed action, purple loosestrife would be controlled manually 1 percent of the time, treated with triclopyr 90 percent of the time, and otherwise treated with aquatic glyphosate (9 percent of the time). These estimates are based on known sites.
5. The sulfonylureas are chlorsulfuron, metsulfuron methyl, and sulfometuron methyl. The Oregon FEIS states these herbicides can quickly confer resistance to plant populations, particularly where they are used extensively as the primary invasive plant control method in cropping systems (USDI 2010a:145).
6. Not a noxious weed; would not be treated with herbicides under the No Action Alternative.
7. This includes common treatment considerations and is not an exhaustive list.
8. 197,740 acres of invasive annual grasses would likely be treated under the No Action Alternative. See Map 2-8, *Post-2010 Projects Treated Under the No Action Alternative,* for those locations. (Few other acres of invasive annual grasses may be treated in other areas with the non-selective herbicide glyphosate.)
9. Such as Canada thistle.
10. Such as Taurian, bull, Scotch, and musk thistles
11. 2,4-D is effective on many different invasive plants and can help curtail seed production, prevent herbicide resistance, and effectively treat multiple invasive plant species when a variety are encountered in a particular treatment area. The amount of 2,4-D used in combination with clopyralid, chlorsulfuron, and metsulfuron methyl would vary, based on these factors. The amount of 2,4-D used in conjunction with picloram and dicamba would likely not vary, as 2,4-D generally would function as the primary effective treatment in such tank mixes.

As an example of the application of the treatment key, the 2015 Annual Treatment Plan is presented in Appendix D.

Monitoring

The 1998 Burns Noxious Weed Management Program EA includes monitoring requirements of:

1. Treated sites would generally receive short and long-term monitoring to determine effectiveness of meeting treatment objectives, impacts on non-target species, and to determine the need for follow-up treatments.

If Special Status species were located near or within areas of herbicide application, monitoring would be conducted to quantify impacts to the Special Status species (USDI 1998:7).

To track the efficacy of imazapic as a medusahead control, as suggested by a restoration monitoring requirement in the Oregon Record of Decision (USDI 2010b:17), the district has established a grid of photo points within several of the recent medusahead treatment areas conducted under EAs listed in Table 2-7. From these photo points, the district takes a systematic random sample of 0.25 square meter plots for further field monitoring. Parameters monitored include pre and post-treatment medusahead infestation levels, tracked over time, and the relationship of those levels with the population of native bunchgrasses. A first year report is in draft.

The Proposed Action - Invasive Plant Management

Introduction

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 14 herbicides district-wide, rather than four. The expansion to invasive plants and, in particular, the inclusion of herbicides selective to invasive annual grasses, greatly increases the number of acres expected to be treated under this alternative. These changes were examined at the programmatic scale in the 2010 *Vegetation Treatments Using Herbicides on BLM Lands in Oregon FEIS* (USDI 2010a).

This alternative fully incorporates the invasive plant control treatments described in eight recent EAs and one DNA tiered to the 2010 Oregon FEIS and shown on Table 2-7. The treatments described in those documents are intended to be fully included in the description of treatments here.[36]

Treatment Sites and Priority Setting

Category 1, Existing documented sites, and ***Category 2, Spread from existing documented sites:*** Over the next 10 to 15 years, the district would expect to control invasive plants on all 26,011 acres in Category 1 (Table 2-1), as well as spread from those acres (Categories 2). Most of these treatments would be conducted using ground-based methods. Although it is desirable to treat all of these acres as quickly as possible, past annual treatment levels in these two categories have been limited by funding and staffing to less than 3,000 acres per year (Table 2-8, Annual Treatment Summary). Consistent with the priorities described in the Steen's Mountain CRMP Resource Management Plan, invasive plant control on disturbed areas such as roads, rights-of-ways, waterholes, and recreational sites will be emphasized (USDI 2005b:33). In part because better control is expected with the broader range of herbicides, roughly one-quarter to one-third of the treatments would be re-treatments of areas treated previously (USDI 2010a:136). These follow-up treatments are more likely to include pulling or other manual treatments as the population at a given site is reduced or is made up of seedlings from a remaining seed bank.

[36] Some of these EAs include herbicide use for vegetation control for fire protection around power poles. Since those treatments appear to have objectives beyond invasive plant control or use herbicides not included in this alternative, those treatments are not incorporated into the Proposed Action.

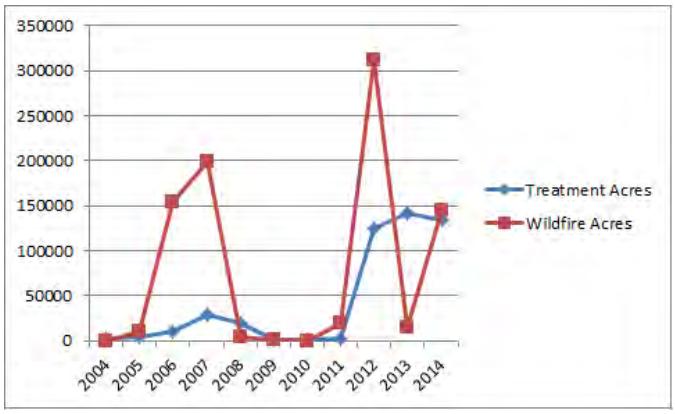
General priorities for selecting annual treatments are described in the *Planning* section under *Background-Invasive Plant Management* earlier in this Chapter. The treatment goal is eradication or control of invasive plants at a level where they are not adversely impacting desired resource values.

Category 3, New Invaders: Treatment scenarios for watch list species are included in the Treatment Key (Table 2-10). For other, currently unknown Category 3 species, treatments will generally follow the treatment scenarios described for related invasive species.

Category 4, Post-fire emergency stabilization and rehabilitation areas: The district also expects to control invasive plants as needed following recent past and future wildfire events, essentially as described in any of the recent Emergency Stabilization and Rehabilitation EAs listed on Table 2-7, but automatically covering future wildfire areas anywhere on the district. These treatments typically include:

- First-year roadside inventory and, when possible, spot treatment of roadsides, known invasive annual grass infestations, and other areas to prevent expansion, and;
- First (when possible), second, and third year entire burn area inventory, spot control treatments, seeding and / or planting (when specified in a separate Emergency Stabilization and Rehabilitation EA), and mapping and planning for invasive annual grass control. Where monitoring shows large areas are becoming dominated by annual grasses, they are broadcast sprayed (ground or aerially) with imazapic. The Holloway EA, for example, estimates such treatments could be needed on approximately 15,000 acres within the 64,900 acre fire perimeter[37] and a four mile buffer (USDI 2013a:22-23).

Figure 2-1. *Relationship Between Wildfire Acreage and Invasive Plant Treatment Acres (District-wide)*



Actual annual Category 4 treatment levels will depend on the areas burned, the invasion of annual grasses and other invasive plants, and available funding. Where invasive annual grasses are present in or near the burned area, treatments may eventually be required on much of the burned area because the fires open up niches for invasive plant establishment or spread, and many vectors move plants from the unburned areas into the burned area. Much of this work would involve imazapic using ground or aerial application methods (see Table 2-8*, Annual Treatment Summary*, as well as Table 2-4, *Summary of Recent Wildfire (1992-2014*) for past treatment and wildfire trends). Figure 2-1, *Relationship Between Wildfire Acreage and Invasive Plant Treatment Acres (District-wide)*, shows how the district's invasive plant treatment program has been affected by recent wildfires.

Category 5, Invasive annual grasses: On the Burns District, invasive annual grasses result in degradation or loss of ecosystem function and changed fire regimes. These changes are particularly problematic in sagebrush ecosystems, and are one of the primary threats to sage-grouse habitat in southeastern Oregon.

Approximately 300,000 acres of medusahead infestations are high priority for control treatments. The district has identified medusahead management blocks (Map 2-9) using existing inventories and observations. Treatments within the blocks are designed to respond to the issues and follow the criteria displayed in Table 2-11. The current estimate is that approximately 30 percent of each identified management unit would be treated with imazapic. Application methods would include both ground-based and aerial equipment.

[37] The wildfire also burned on the Vale District and in Nevada; these numbers are only for the Burns portion of the fire.

Table 2-11. Medusahead Management Block Priority Matrix

Treatment Block Locations	**Management Block Acres (*Estimated Treatment Acres*)**	**Resource Values**[1]	**Money Secured**[2]	**Private Landowner Efforts**[3]	**Partner Priorities**[4]	**Resource Value Priorities**[5]	**Remnant Desirable Veg**[6]	**Threshold For Control**[7]	**Enhance Sage Grouse Habitat**[8]	**Benefits Special Status species**[9]	**Total Points**	**Year Treatment Anticipated** (Autumn of)
Bartlett Fire[10]	32,583 *(10,000)*	Seeding investment; native vegetation response to fire; Traditional gathering area	0	10	2	8	5	2	10	5	42	In Process
Beaver Tables[10]	47,440 *(5,000)*	Medium infested acres; High potential for spread	0	5	5	5	4	5	4	1	28	2015 / 16
Crane-Riverside[11]	150,243 *(70,000)*	High infested acres	0	5	5	2	2	2	7	4	25	2015 / 16
DSL Fire + N. East Steens[10]	13,084 *(2,000)*	High disturbance; area of high use; protect high levels of adjacent uninfested acres	5	?	1	10	5	3	10	1	35	In Process
East Bartlett[10]	15,434 *(4,000)*	High infested acres; High percent of late seral habitat	0	NA	1	6	5	4	9	5	30	In Process
Frazier Field	10,398 *(3,000)*	High potential to spread; Protect adjacent uninfested acres	0	0	1	10	5	3	10	1	30	2016 / 17
Front Range	159,307 *(10,000)*	Low acres infested; Bisuitroot ACEC; Traditional gathering area;	0	3	4	5	3	4	9	3	28	2017
Happy - Riddle[10]	31,498 *(5,000)*	High levels of adjacent disturbance; wild horses	5	10	4	5	3	3	8	1	39	In Process
Infested Roads[11]	100,000 *(100,000)*	Protect adjacent lands	5	NA	NA	10	NA	NA	NA	NA	15	All
Lamb Ranch Fire[10, 12]	240 *(240)*	Enhance advantage from wildfire	5	3	2	1	5	3	10	5	34	In Process
N. Drewsey[11]	202,246 *(20,000)*	High potential to spread; Biscuitroot Cultural ACEC; Traditional gathering area: Many projects involving prescribed fire	0	3	5	8	3	3	10	3	35	2015
Pike Creek	52 *(52)*	Protect lots of adjacent uninfested acres	0	0	1	3	4	5	10	1	23	2016 / 17
Riley Area [10]	142,595 *(30,000)*	High potential to spread; High levels of adjacent disturbance	0	0	5	3	3	3	8	3	25	Partially treated

Treatment Block Locations	**Management Block Acres (*Estimated Treatment Acres*)**	**Resource Values**[1]	**Money Secured**[2]	**Private Landowner Efforts**[3]	**Partner Priorities**[4]	**Resource Value Priorities**[5]	**Remnant Desirable Veg**[6]	**Threshold For Control**[7]	**Enhance Sage Grouse Habitat**[8]	**Benefits Special Status species**[9]	**Total Points**	**Year Treatment Anticipated** (Autumn of)
Smyth – Kiger North[10]	12,865 *(2,000)*	High levels of adjacent disturbance; wild horses	5	5	4	5	5	5	9	1	39	In Process
Stinkingwater	121,919 *(40,000)*	High infested acres; High levels of adjacent disturbance. High percentage of late seral habitat; wild horses; Biscuitroot Cultural ACEC; Traditional gathering area	0	6	3	5	3	3	8	4	32	2015 / 16
Westin Mine	10 *(10)*	Low acres infested; Protect lots of adjacent uninfested acres	0	0	0	3	4	5	4	1	17	2016 / 17
Wildhorse Creek	4,283 *(1,000)*	Low acres infested; Protect lots of adjacent uninfested acres	0	0	1	3	4	5	4	1	17	2016 / 17
Willow	36,282 *(6,000)*	High potential to spread; High adjacent disturbance	0	0	5	3	3	3	8	3	25	2015 / 16

1. Resource values – acres infested: High: >50%; Medium: 20-50%; Low: <20%
2. Money Secured: Yes=5; No=0
3. Private Landowner Efforts: High - 10; Low - 1
4. Partner Priorities: High - 5; Low - 1
5. Resource Value Priorities: High -10; Medium-5; Low-1
6. Remnant Desirable Vegetation: >50%-5; 50-25%-3; <25%-1
7. Threshold for control: Saveable-5; Manageable-3; Containment-1
8. Enhance Sage Grouse Habitat: Primary priority habitat =10; Primary general habitat =6; Unclassified=4; Non-sagebrush=1
9. Benefits Special Status species: Yes=5; No=0
10. NEPA is completed and these treatments could proceed under the No Action Alternative.
11. NEPA is completed that covers part of this treatment block, and treatments could in those areas under the No Action Alternative.
12. Lamb Ranch Fire management block is contained within the N. Drewsey management block.

Annual treatment levels would depend on funding levels and other district invasive plant management priorities. Medusahead is the highest broad-scale invasive plant control priority on the district, and it is highly desirable to treat these areas within the next 5 to 15 years (20,000 to 60,000 acres per year). Treatment goals are to control medusahead giving co-occurring desirable vegetation an opportunity to out-compete the medusahead, to reduce medusahead seed production and seed in the soil seed bank, and to reduce opportunities for medusahead establishment. In many areas, there are enough desirable perennial plants in the plant community to preclude a need to reseed.

Cheatgrass and other invasive grasses are found throughout the district. The district is currently developing a strategy to safeguard landscapes where resource values are at risk from more frequent and / or large-scale wildfires and other threats such as increases in invasive annual grasses. As a part of this strategy, the district has identified Management Units (based on Fire Management Units originally developed by the fire program) wherein a variety of management actions would be implemented (as funding and priority allows), to protect the ecological values identified in those Units. For the direction in this EA, management of invasive annual grasses, particularly the cheatgrass and ventenata component (since medusahead management is specifically addressed above) is significant to potential treatment areas because it is directly related to increased risk of large-scale wildfire events, which endanger adjacent landowner rangelands and structures, increase safety concerns for wildland firefighters, and reduce habitat for sagebrush obligate species including Greater sage-grouse. It is estimated that at least 500,000 acres would benefit from strategic cheatgrass management in the district.

In general, invasive annual grass treatment areas will be in one of two situations:

1. Areas with relatively intact native vegetation, but with invasive annual grasses as a component in the understory. Here the management goal is to minimize the area of sagebrush habitat converted to annual grass-dominated vegetation.
2. Areas biologically dominated by invasive annual grasses. Here the management goal is to divide large areas with continuous fine fuels (the dense invasive annual grasses) into smaller areas where fires can be contained at a manageable size.

Essentially, the goals for both situations are the same: minimize the scale and occurrence of invasive annual grasses in order to, among other things, increase fire return intervals, and prevent large-scale wildfires.

Depending on the specific conditions, the invasive plant control may be followed by reseeding or planting of perennials including sagebrush. In some situations, fuel breaks will be used to separate more desirable plant communities from those infested with invasive annual grasses or to break up large areas of homogenous fuels into areas more defendable when fires occur. Fuel breaks could range from a mowed strip that changes the height of fuels, to strips that are disked, sprayed, and planted with more fire resistant species such as crested wheatgrass (*Agropyron cristatum*), Sandberg bluegrass (*Poa secunda*), or forage kochia (*Bassia prostrata)*. However, seeding, planting, and the design of fuel breaks are projects outside the scope of this EA and would have their own NEPA compliance.

Category 6. Lower priority invasive plants: Plants in this category would not normally be treated except in conjunction with treatments of other plant species on the same site, or if they begin to threaten native ecosystems.

The Herbicides

Control efforts would use a variety of treatment methods including the 14 herbicides available under this alternative (see Table 2-9).

Selection of the Treatment Method

Working within the priorities and constraints described in the *Planning* section under *Background – Invasive Plant Management* earlier in this Chapter, the identification of what treatments to use and, where applicable, the actual herbicide to be used would follow the criteria presented in the Treatment Key (Table 2-10). Treatments on the Treatment Key are listed by preferred treatment method first, followed by second and third choices and so on in priority order, with selection based primarily on the factors listed on the table. The percent of time each choice would be used has been estimated, based on current information about documented invasive plant sites. Herbicide mixes, or second or third choice treatments, are also used for follow-up treatments to control plants surviving previous treatments. Where treatment sites are near water bodies, an aquatic herbicide formulation may be specified to meet site protection objectives. Otherwise, second or third choice treatments would be used as dictated by the soil, season, and other criteria included in Table 2-10, or when Standard Operating Procedures, Mitigation Measures, Best Management Practices, or Conservation Measures (Appendix A) preclude the use of the first choice because of the presence of humans, livestock, or other resources that would be put at risk by the first choice. For example, a Mitigation Measure precludes the use of 2,4-D in wild horse Herd Management Areas during peak foaling season (March through June, and especially in May and June)(see Appendix A).

Monitoring

This alternative would continue the No Action Alternative monitoring requirements of:

1. Treated sites would generally receive short and long-term monitoring to determine effectiveness of meeting treatment objectives, impacts on non-target species, and to determine the need for follow-up treatments.
2. On-going species monitoring would continue to document all management effects to listed species.

To track the efficacy of imazapic as a medusahead control (as suggested by a restoration monitoring requirement in the Oregon Record of Decision (USDI 2010b:17), the district has established a grid of photo points within several of the recent medusahead treatment areas conducted under EAs listed in Table 2-7. From these photo points, the district takes a systematic random sample of .25 square meter plots for further field monitoring. Parameters monitored include pre and post-treatment medusahead infestation levels, tracked over time, and the relationship of those levels with the population of native bunchgrasses. A first year report is in draft.

Because nation-to-nation consultation with tribes indicated a concern about herbicide residues on plants used as food by tribes, and the potential for imazapic applications to be conducted in areas where prairie and meadow roots and other crops are gathered, the district will collect known food crops used by tribes from sprayed areas, test them for residues, and make the results available to the public and the tribes.

Wilderness

This alternative would sometimes require late-season landing of a helicopter in remote parts of the Steens Mountain Wilderness for insertion and retrieval of invasive plant strike teams. The purpose of these landings would be to reduce the risk to personnel in case of a wildfire event where ingress and egress is of immediate concern. The analysis of this alternative will consider the effects on Wilderness, on invasive plant spread in Wilderness, and on human health and safety, both with and without helicopter landing.

The 2015 Treatment Plan

The requirements for an Annual Treatment Plan and its review are described in the *Background – Invasive Plant Management / Planning* section earlier in this chapter. Invasive plant control activities planned for Burns District in 2015 are summarized in Appendix D. The information is presented as an example of implementing the priorities

described in the alternatives. Completed 2014 control activities were analyzed in NEPA documents described under the No Action Alternative.

Alternatives Considered but Eliminated from Detailed Study

No Herbicides

An alternative was considered that would manage invasive plants with a full range of treatment methods except herbicides. This alternative was eliminated from detailed study because a no-herbicides reference analysis was included in the Oregon FEIS (USDI 2010a:27) and indicated the rate of spread for noxious weeds would increase over time. A no-herbicides alternative would not meet the *Need* for more effective invasive plant control.

No Aerial Herbicide Application

An alternative was considered that is the same as the Proposed Action, except it would not use aircraft for any herbicide application. This alternative was eliminated from detailed study because it was considered in the PEIS and, as described in the Oregon FEIS, was rejected because large expanses of invasive annual grasses and other invasive plants in remote areas or areas with rugged terrain would be difficult and cost-prohibitive to treat. In addition, using ground-based methods in rugged terrain would increase injury and herbicide exposure risks for workers (USDI 2010a:34). It would also limit the ability to conduct large-scale treatments with minimal disturbance in sensitive areas such as Wilderness Study Areas and cultural sites, where other ground equipment would not be allowed or would cause unacceptable levels of ground disturbance. In addition, nothing in the issues identified during scoping suggested a need to analyze such an alternative.

Use Fewer of the Herbicides Approved for Consideration for Invasive Plants by the Oregon FEIS

An alternative was considered that would remove one or more herbicides from consideration for various reasons including stated risks or apparent lack of need. This alternative was eliminated from detailed study because all of the herbicides have specific species or conditions for which they are the most suitable for control. Having a larger range of herbicides available helps applicators select the most appropriate one for site conditions, timing, and management objectives, and helps avoid resistance to specific herbicides. Nothing in the EA analysis indicated a need to remove any of the herbicides. The herbicides included in the Proposed Action are the same as those examined in the Oregon FEIS for Alternative 3, the FEIS alternative that addresses invasive plants and is most like the Proposed Action in this EA.

Limit Herbicide Treatments to Early Detection Rapid Response

An alternative was considered that used the 14 herbicides included in the Proposed Action, but their use would be limited to early detection rapid response-type treatments of new sites or new species. Prevention and education would become the primary focus of the invasive plant management program for the Burns District. No large-scale herbicide treatments would be implemented and existing invasive plant sites would not be actively controlled with herbicides.

This alternative was eliminated from detailed analysis because the BLM considers active control of established infestations essential to preventing or reducing ecologic and economic degradation. Preventing invasive plant

spread to uninfested areas is cost-effective and consistent with current laws, administrative direction, and the District Resource Management Plans.

Include the use of Herbicides for Vegetation other than Invasive Plants

General Road and Administrative Site Maintenance

An alternative was considered that would make all 17 herbicides from the Oregon Record of Decision available and allow them to be used on both invasive and native vegetation to meet safety and operations objectives (clearing) along roads and around administrative sites. The Oregon Department of Transportation and others responsible for road maintenance use herbicides to maintain site clearances and protect investments, for example. The BLM agrees herbicides may be a needed maintenance tool, and acknowledges that such treatments would have a significant added benefit of inadvertently controlling invasive plants not detected by invasive plant control crews. However, this alternative was eliminated from detailed analysis because the Need for more effective road and site maintenance tools is different from the invasive plant control *Need* for this EA and is thus outside the scope of this analysis.

Habitat Management

An alternative was considered that would make all 17 herbicides from the Oregon Record of Decision available and allow them to be used on both invasive and native vegetation to improve Special Status species habitat objectives. Examples of this could include: thinning of sagebrush with tebuthiuron to improve Greater sage-grouse habitat and treatment of other native species to promote special Status Species habitat restoration.

This alternative was eliminated from detailed analysis because considerations of habitat management is a broad topic beyond the invasive plant control *Need* guiding the analysis in this EA, and is thus outside the scope of this analysis.

Chapter 3 – Affected Environment and Environmental Effects

Introduction and Issues

This Chapter describes the natural, cultural, and social environment of public lands on the Burns District that would potentially be affected by the alternatives under consideration. It focuses on issues that were identified during scoping, and presents the consequences of the No Action and Proposed Action Alternatives relative to those issues.

Internal and external scoping identified the issues to be addressed in the effects analysis in this Chapter. Issues are analyzed when:

- analysis is necessary for making a reasoned choice from among the alternatives (e.g. is there a measureable difference between the alternatives with respect to the issue);
- the issue identifies a potentially significant environmental effect; or,
- public interest or law / regulation dictate that effects should be displayed.

Issues meeting these criteria have been framed as questions and used to guide the analysis in the individual resource sections in this Chapter. The issues are stated at the start of each resource section in this Chapter, and they are all listed in Chapter 1. Resource sections focus on these issues, avoiding discussions of resource parameters not relevant to the decision to be made.

Human Health and Ecological Risk Assessments

The following section is incorporated from Appendix 8 of the Oregon FEIS (USDI 2010a:605-606).

One of the Purposes identified in Chapter 1 is *Prevent control treatments from having unacceptable adverse effects to applicators and the public, to desirable flora and fauna, and to soil, air, and water*. To help address this Purpose, the EA, and the Oregon FEIS that it tiers to for herbicides, rely on BLM and / or U.S. Forest Service-prepared Human Health and Ecological Risk Assessments for the 14 herbicides included in this EA. The Risk Assessments are used to quantitatively evaluate the probability (i.e. risk) that herbicide use in wildland settings might pose harm to humans or other species in the environment. As such, they address many of the risks that would be faced by humans, plants, and animals, including Special Status species, from the use of the herbicides. The level of detail in the Risk Assessments for wildland use exceeds that normally found in EPA's registration examination. Court decisions and others affirmed that although the BLM can use EPA toxicology data, it is still required to do an independent assessment of the safety of pesticides rather than relying on *Federal Insecticide, Fungicide and Rodenticide Act* registration alone.

Risks to non-target species associated with herbicide use are often approximated via the use of surrogate species, as toxicological data do not exist for most native non-target species. Survival, growth, reproduction, and other important sub-lethal processes of both terrestrial and aquatic non-target species were considered. The Risk Assessments considered acute and chronic toxicity data. Exposures of receptors[38] to direct spray, surface runoff, wind erosion, and accidental spills were analyzed.

[38] A biological entity such as a human, fish, plant, or mollusk.

The Risk Assessments and the Oregon FEIS include analyses of inerts and degradates for which information is available and not constrained by confidential business information (CBI) restrictions. To the degree a toxic substance is known to pose a significant human or ecological risk, the BLM and U.S. Forest Service have undertaken analysis to assess its impacts through Risk Assessments. Information about uncertainty in Risk Assessments is included in the Oregon FEIS, Appendix 13.

A summary of the risk ratings from the Risk Assessments, along with an explanation of how the risk ratings were derived, is included in Appendix C, *Herbicide Risk Assessment Summaries*, of this EA. The risk ratings included in that Appendix are the source for much of the individual herbicide information, including the high-moderate-low-no risk ratings, presented in each of the resource sections in this Chapter.

It is important to remember that risk ratings are based on exposure scenarios described in the Risk Assessments. The likelihood of actual exposures comparable to those described in the Risk Assessments is reduced by application of Standard Operating Procedures and Mitigation Measures (see below), as well as by the nature of the application and the location and actions of the receptor.

Relationship of Effects to the Standard Operating Procedures and Mitigation Measures

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 (listed in Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*).[39] 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 2007c: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 an effect on foraging plants (even within pollinator season).

PEIS Mitigation Measures 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* (PEIS; USDI 2007a), and adopted by its Record of Decision (also listed in Appendix A). In other words, NO potentially significant adverse effect identified in the PEIS analysis remained at the programmatic scale after the 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.

Oregon FEIS Mitigation Measures were identified and adopted for adverse effects identified in the *Final Vegetation Treatments Using Herbicides on BLM Lands in Oregon Environmental Impact Statement* (Oregon FEIS; USDI 2010a). Application of these measures (also listed in Appendix A) 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. No potentially significant adverse effect was identified at the programmatic scale in the Oregon FEIS with the Standard Operating Procedures and Mitigation Measures applied.

[39] Manual-directed Standard Operating Procedures and other standing direction may be referred to as best management practices in resource management and other plans.

Effects Determinations in this Environmental Analysis

The individual resource sections in this Chapter typically cite various risk levels from the Risk Assessment tables in Appendix C, *Herbicide Risk Assessment Summaries*. These serve as indicators of a potential adverse effect from an herbicide application. The analysis sections then reference key Standard Operating Procedures and Mitigation Measures, describe the proposed applications, describe the potential for their resource to experience the Risk Assessment-modeled exposure scenarios, and draw conclusions as to whether the alternatives have the potential for significant adverse effects at the site-specific scale. Effects are also based on estimates of the amount of acres to be treated with each herbicide and treatment method as shown on Table 3-1, *Estimated Treatment Acres*. The individual resource sections also tier to the Oregon FEIS. Anticipated herbicide treatments on BLM administered lands in Oregon were analyzed in the Oregon FEIS at the programmatic scale.

Cumulative Effects

Cumulative effects are addressed for each of the individual resource sections. Cumulative effects to the environment are defined in the Council on Environmental Quality regulations as those that result from the incremental effects of a proposed action when added to other past, present and reasonably foreseeable future actions, regardless of which agency or person undertakes them (40 CFR 1508.7). Effects from past actions are, consistent with Council on Environmental Quality direction, generally considered part of the description of the affected environment in the resource sections in this Chapter. Reasonably foreseeable actions from the discussions and Table 3-3 below, and others, are addressed in the cumulative effects discussions for each resource as applicable.

Reasonably Foreseeable Actions

Neighboring Lands Pesticide Use

For two years beginning in 2007, the State of Oregon compiled pesticide use in the State via the self-reporting Pesticide Use Reporting System. Reports compile the resultant information by major water basin. There were a number of problems with pesticide use reporting; it was voluntary and some of the reporting fields were ambiguous, so the amount of pesticide use reported was likely underestimated. However, the ODA's 2008 Annual Report does provide the best available information on the use of pesticides in Oregon (USDI 2010a, ODA 2009).

About 82 percent of the BLM-administered lands on the Burns District lie within the Oregon Closed Basins, 13 percent within the Middle Snake / Boise Basin, and 5 percent within the Black Rock Desert Basin[40] (see Figure 3-1). The Oregon Closed Basins essentially cover Lake and Harney Counties,[41] and the Burns District BLM-administered lands occupy 26 percent of the Oregon Closed Basins. For 2008, 63,531 pounds of the pesticides (including herbicides) were reported used in the Oregon Closed Basins, as shown in Table 3-2. Estimates of the annual pounds of herbicide to be applied on Burns District-administered lands under the No Action and Proposed Action Alternatives are also shown, based upon Table 3-1, *Estimated Treatment Acres*. The BLM's Lakeview Resource Area also manages about 31 percent of the Oregon Closed Basins, so the level of proposed herbicide use from their recently completed Invasive Plant Management EA is also included on Table 3-2.

[40] A subpart of the Great Basin.
[41] Except for small areas of Lake County draining to Goose Lake or the Deschutes River, and the northeastern corner of Harney County draining to the Snake River.

Table 3-1. Estimated Treatment Acres (by Alternative and Category)

Light background indicates that the herbicide may be available for use on invasive plants in limited areas under the No Action Alternative (see Table 2-7, Summary of NEPA Covering the No Action Alternative, and Map 2-8). All 14 herbicides are available for use District-wide on invasive plants under the Proposed Action. Acres estimates for Categories 1 and 5 include total acres that need treatment and could be treated over the life of the plan. Category 2 acres are the first year estimate; treatment estimates after the first year would depend on the acres of existing sites. The size of Categories 3, 4, and 6 are unknown.

Treatment Methods	**Category 1 Acres**		**Category 2 Acres**		**Category 3 Acres**		**Category 4**		**Category 5**		**Category 6**	
	Documented sites		Estimated 1st year Future Spread from Existing Sites[4]		New Invaders		Post fire emergency stabilization and rehabilitation		Invasive Annual Grasses		Low Priority Invasive Plants[2]	
	No Action[1]	Proposed Action[1]	No Action[1]	Proposed Action[1]	No Action[1]	Proposed Action[1]	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action
2,4-D	18,852	18,226	2,262	1,799	Rare	Rare	See note	See note	0	0	NA	Unknown[2]
Picloram	7,930	3,583	952	354					0	0		
Dicamba	6,615	1,848	794	182					0	0		
Glyphosate	961	939	115	93					0	0		
Chlorsulfuron	6,880	11,710	826	1,156	Rare				0	0		
Clopyralid	3,121	10,630	375	1,049					0	0		
Imazapic	0	0	0	0					240,000	773,500		
Sulfometuron methyl	0	0	0	0					0	1,000		
Metsulfuron methyl	NA	1,905	NA	188	NA		NA		NA	0		
Dicamba + Diflufenzopyr		7		1						0		
Imazapyr		11		1						0		
Triclopyr		3		0						0		
Fluridone		0		0						0		
Hexazinone		0		0						500		
Manual control	131	131	16	13	Rare		See note		0	0	Unknown[2]	
Mechanical control	1	1	0	0					0	0		
Targeted grazing	0	0	0	0	0	0			15,000	42,500		
Total Acres of Treatments[3]	*44,491*	*48,994*	*5,340*	*4,816*	*Rare*		*See note*		*255,000*	*817,500*	*Unknown*[2]	
Total Acres of Invasive Plants	*23,771*	*26,011*	*2,853*	*2,567*			*Unknown. Based on fire size.*		*Noxious weeds: 300,000 Invasive Plants: 800,000*			
Annual Average Treatment Acres	*Based on previous funding, approximately 3,000. (If more funding were available, more acres would be treated.)*						*No Action: Approximately 20,000. Proposed Action: Up to 100,000, including 20,000 – 60,000 of medusahead rye*[5]				*0*[2]	

Table 3-1 is a summary of information found in Chapter 2.Category 1 acres are calculated based on Table 2-1 (*Summary of Documented Invasive Plant Sites)* and treatments described in Table 2-10 (*Treatment Key*). The spread rate is discussed as part of the Category 2 section, etc. The annual averages are based off of Table 2-8 (*Annual Treatment Summary).*

NA: Not available under this alternative

Note: Future fire locations and sizes are unknown, and hence acres to be treated are unknown. Fires that had emergency stabilization and rehabilitation NEPA previous to this EA were subsequently inventoried, and those acres are included in the Categories 1 and 5 count

1. No Action acres include only noxious weeds. Proposed Action acres include invasive plants.
2. Low priority species would only be treated in conjunction with treatments of other similar species at the same site.
3. Acres total more than total invasive plants acres because some sites are treated with more than one herbicide (tank mix) or treatment method (e.g., grazing and imazapic on invasive annual grasses).
4. Estimated first year based on a 12 percent (No Action Alternative) or 9.87 percent (Proposed Action) spread rate (USDI 2010a:596) of the Category 1 sites.
5. Based on an estimated 300,000 acres of infestation that will be treated in the next 5-15 years. An additional 500,000 acres of cheatgrass will be treated as necessary to safeguard landscape from fire.

The Burns District occupies such a small percentage of the Middle Snake / Boise and Black Rock Desert Basins, basins that extend significantly outside the State, that a similar comparison would have little meaning.

Table 3-2. Pounds of Herbicides used in Oregon Closed Basins 2008[1], and BLM Current / Proposed Annual Use

Herbicide	Total lbs. in Oregon Closed Basins	BLM Lakeview Resource Area Current Direction		Burns District			
				No Action Alternative		Proposed Action	
		Lbs.[2]	% of Oregon Closed Basins	Lbs.[4]	% of Oregon Closed Basins	Lbs.[4]	% of Oregon Closed Basins
Glyphosate	16,987	495	3%	19	0.1%	19	0.1%
2,4-D	15,453	1,532	10%	1,762	11%	1,704	11%
Diuron	6,846	0	0%	0	0%	0	0%
Atrazine	5,877	0	0%	0	0%	0	0%
Hexazinone	5,009	14	<1%	0	0%	25	0.5%
All Others	13,360	1,076[4]	8%[3]	2,356[5]	18%[3]	5,183[5]	39%[3]
Total	63,531	3,117	5%[3]	4,137	7%[3]	6,931	11%[3]

1. Source: Oregon Department of Agriculture, Pesticide Use Reporting System 2008 Annual Report (June 2009)
2. See Lakeview Resource Area Invasive Plant Management EA (USDI 2015b) for more information.
3. The *All Others* line includes herbicides with application rates ranging from less than an ounce to pounds per acre, so a direct comparison may not be meaningful.
4. Assumes 12 percent of 26,000 Category 1 acres per year (3,000 acres) and 50,000 acres of imazapic per year under the No Action and Proposed Action alternatives, and 83 acres sulfometuron methyl and 42 acres hexazinone in Category 5 annually, reduced by 18 percent to reflect that portion of the District not in the Oregon Closed Basins.
5. Includes 1,800 and 5,400 pounds of imazapic for the No Action and Proposed Action Alternatives in Category 5.

Figure 3-1. Oregon Closed Basins

Unlike much of the rest of the State, the primary pesticides used in Harney and Lake Counties are herbicides (Table 3-2). A small portion of those are used on other Federal lands, almost exclusively to control invasive plants (see below). An unknown quantity is used by State and County road departments primarily for road maintenance. Most of the remainder is used on private lands (25 percent of the basins). This includes agricultural lands where hay and other feed crops are the primary use.

Other Federal Lands

Within the Burns District planning area boundary, is the U.S. Fish and Wildlife Service Malheur National Wildlife Refuge. Their current (2014) management plan and EIS calls for integrated pest management for nine species of invasive plants on the refuge, and provides a detailed site-specific examination and approval process designed to minimize the likelihood of adverse effects to refuge resources. The plan does not include a prediction of what herbicides might be used and in what amounts (USDI 2014a).

Approximately 40 percent of the Malheur National Forest falls within the Oregon Closed Basins, with most of the remainder in the John Day River Basin that the Burns District does not share. The Forest does not currently use pesticides, but a 2013 Invasive Plants Treatment Project Draft EIS proposed, in the most aggressive scenario under

the Proposed Action, treating up to 2,124 acres of invasive plants per year. Assuming 40 percent of those acres are within the Oregon Closed Basins,[42] and assuming the U.S. Forest Service typical application rate is used, the proposed action could apply 42 pounds of aminopyralid, 13 pounds of chlorsulfuron, and two pounds of metsulfuron methyl per year (USDA 2013:24-26). About five percent of the known invasive plants are within 25 feet of streams or ditches (USDA 2013:68).

The Bonneville Power Administration (BPA) and certain other BLM permittees have responsibility for noxious weed control on their rights-of-way on BLM-administered lands, and the BLM monitors noxious weed populations and works cooperatively with BPA to control these plants. The noxious weeds in these permitted areas and planned treatments are included in the treatment estimates, and the analysis, for both alternatives in this EA.

Other Foreseeable Actions

The following additional ongoing and foreseeable management activities on the Burns District (see Table 3-3) could create effects to some of the same resources potentially affected by treatments done under one or both of the alternatives in this EA. Activities from Table 3-3 are considered in the various resource sections in this Chapter as they apply.

Table 3-3. Foreseeable Actions Potentially Relating to Cumulative Effects

Name	Description	Location	Status of Action	Type of Project
District-wide Rights-of-Way	Ongoing rights-of-ways for right-of-way Holders	BLM Burns District (specific locations available upon request from Realty Specialist)	On-going	Rights-of-Way
District-wide Communication Sites	Operation of communication sites for public, private, State of Oregon, Forest Service, BLM, right-of-way holders	Wrights Point, Wagontire Mountain, Jack Mountain, Buckskin Mountain, Burns Butte, Riddle Mountain, Riley Area, Beatty's Butte, King Mountain, Steens Mountain	On-going	Communication Site
Otis Mountain – Moffit Table Restoration Project	Cut, pile, and burn encroaching of western juniper on a landscape scale encompassing approximately 20,407 acres to return vegetation communities to historic shrub-step and reduce hazardous fuel loads in Northern Great Basin sage-grouse primary habitat.	Three Rivers Resource Area	On-going	Habitat Restoration
North Steens Ecosystem Restoration Project	Treat expansion western juniper on a landscape scale encompassing approximately 336,000 acres CMPA to return vegetation communities to historic compositions and reduce hazardous fuel loads.	Steens Mountain Cooperative Management and Protection Area	On-going	Habitat Restoration

[42] Invasive plants are throughout the Malheur National Forest but concentrated in the Middle Fork John Day drainage (USDA 2013:144).

Name	Description	Location	Status of Action	Type of Project
Lake Creek / Boone Canyon Forest Restoration Project	Thin, pile, and burn expansion juniper and ponderosa pine. Future planning includes an under-burn.	Three Rivers Resource Area	On-going	Habitat Restoration
2011 Happy Valley Allotment Management Plan[1]	Renew grazing, fences, water development, seeding, and medusahead rye control using herbicides	Three Rivers Resource Area	On-going	Allotment renewal, range improvements
2015 Alder Creek Restoration[1]	Ecological restoration projects (channel restoration and juniper treatment, each with corresponding invasive plant surveys and treatments) address the stream channel instability and encroached juniper in 7,187 acres. In-stream structures, fences, invasive plant treatments, and juniper treatments within the 34 acre Alder Creek Pasture	Three Rivers Resource Area	Begin in 2015	Habitat Restoration
2013 Pine Creek Allotment Management Plan[1]	Modify and renew grazing, treat noxious weeds	Three Rivers Resource Area	Ongoing	Allotment renewal, range improvements
2012 DSL and Smyth Creek Fires Emergency Stabilization and Rehabilitation Plans[1]	Herbicide control of medusahead rye and others, aerially seed forage kochia on 260 acres, and close burned areas to grazing	Andrews Resource Area	Ongoing	Emergency Stabilization and Rehabilitation
Three Rivers Under Burning Project	Prescribed fire to control expansion juniper and ponderosa pine.	Three Rivers Resource Area	On-going	Forest Health
Forks of Poison Creek / Devine Ridge Vegetation Management Restoration	Prescribed fire to control expansion juniper and ponderosa pine. The burned area was seeded in spring 2011. Ongoing work includes maintaining several aspen fences in the burn area.	Three Rivers Resource Area	On-going	Forest Health
Slick Ear / Claw Creek Forest Restoration Project	Reduce hazardous fuels, restore plant communities, and improve wildlife habitat diversity. The emphasis on treatments would be in forested areas.	Three Rivers Resource Area	On-going	Forest Health
The SHED Forest Restoration Project	Thin, pile, pile burn, and implementing a forest under-burn.	Three Rivers Resource Area	On-going	Forest Health
Camp Harney / Cow Creek Ecological Restoration Project	Thin, pile, pile burn, and implementing a forest under-burn.	Three Rivers Resource Area	On-going	Forest Health
Dry Lake Ecological Restoration Project	Thin, pile, pile burn, and implementing a forest under-burn.	Three Rivers Resource Area	On-going	Forest Health

Name	Description	Location	Status of Action	Type of Project
Five Creeks Rangeland Restoration Project	A landscape-scale vegetation treatment encompassing approximately 73,500 acres (approximately 26,000 acres in the CMPA) to return vegetation communities to historic compositions and reduce hazardous fuel loads. Various forms of prescribed fire and mechanical treatments have been utilized to reduce influence of encroaching western juniper.	Three Rivers and Andrews / Steens Resource Areas	On-going	Habitat Restoration
SES Project	Reduce hazardous fuels, restore plant communities, and improve wildlife habitat diversity. The emphasis on treatments would be in forested areas.	Three Rivers Resource Area	On-going	Forest Health
North Steens 230-kV Transmission Line Project	Construct a transmission line across public (12 miles) and private lands (34 miles) to carry wind energy from a facility located on private lands.	North Steens Area, Harney County	Record of Decision signed, in Litigation	Right-of-Way
District-wide noxious weed treatments	Ongoing interagency efforts with Oregon Department of Agriculture and Harney County	Harney County	On-going	Vegetation Treatment
Steens Mountain Comprehensive Recreation Plan	Multi-year plan to manage recreation on Steens Mountain including maintenance of existing facilities, creating new facilities, creating new trails, closing roads, and providing interpretation.	Steens Mountain Cooperative Management and Protection Area	EA out for additional comment Fall / Winter 2014 / 2015; Preparing the Decision Record for EA Spring 2015	Recreation / Recreation Facilities / Roads
Wild Horse Gathers	Remove excess wild horses to achieve a population within the established appropriate management level	District Wide	On-going	Wild Horse & Burro Program
Geothermal Testing	Drill test wells for geothermal exploration	Glass Buttes	Implementation August 2014	Fluid Mineral Lease
Beede Desert	Materials storage; partially reclaimed; 3 acres on BLM land	Celatom Mining area	On-going	Mining
Kelly Field	Open pit mining and operations on 205 acres	Celatom Mining area	On-going	Mining
Puma Claim	Mining operations on 5 acres	Celatom Mining area	On-going	Mining
Hidden Valley	Active open pit mining of diatomaceous earth on 255 acres authorized in 2012	Celatom Mining area	On-going	Mining
Holloway ES&R[1]	Rehabilitation efforts following wildland fire.	Trout Creek Mountain	On-going	Emergency Stabilization and Rehabilitation
Miller Homestead ES&R[1]	Rehabilitation efforts following wildland fire	Catlow Valley	On-going	Emergency Stabilization and Rehabilitation

Name	Description	Location	Status of Action	Type of Project
GSHIP (Greater Sage-grouse Habitat Improvement Project)	Reduce hazardous fuels, restore plant communities, and improve wildlife habitat diversity. The emphasis on treatments would be in forested areas.	Three Rivers Resource Area	On-going	Habitat Restoration
Buzzard Complex Fire ES&R[1]	Rehabilitation efforts following wildland fire	Three Rivers Resource Area	Implementation Starting Fall 2014	Emergency Stabilization and Rehabilitation
Gumboot Fire ES&R[1]	Rehabilitation efforts following wildland fire.	Three Rivers Resource Area	Implementation Starting Fall 2014	Emergency Stabilization and Rehabilitation
Wyoming Sagebrush Beating for Wildfire Fuel Breaks EA	Construction of fuel breaks in sagebrush on 12,000 acres	Three Rivers	On-going	Habitat Restoration
Burns District Office – Upcoming Projects (no NEPA review to date)				
Wagontire Wind Energy Testing	Operation of 2 weather towers to determine feasibility for a wind farm development.	Three Rivers Resource Area	Application being processed Fall 2014	Right-of-Way
Alder Creek Restoration	Ecological restoration projects (channel restoration and juniper treatment, each with corresponding invasive plant surveys and treatments) address the stream channel instability and encroached juniper in 7,187 acres	Three Rivers Resource Area	EA on hold pending completion of this invasive plants EA	Habitat Restoration
District-wide Long Term Strategy Project for Wildfire and Invasive Grasse	Interdisciplinary team working to develop a strategy to safeguard landscapes where resource values are at risk from more frequent and / or large-scale wildfires and other threats such as increases in invasive annual grasses.	BLM Burns District Long Term Strategy Management Units (based on Fire Management Units)	On-going work on the Strategy; may require future planning documents	Habitat Restoration
Upton Mountain Allotment Management Plan	Medusahead rye and cheatgrass control with herbicides and targeted grazing in 13,714 acres to increase fire return intervals and restoration of sagebrush steppe	Three Rivers Resource Area	EA expected out to the public in Fall / Winter of 2014 / 2015	Range Management
Warm Springs Irrigation District FERC Project and Right-of-Way	Warm Springs Dam conversion to generate energy and provide irrigation	Burns and Vale District	FERC Lead for NEPA	Right-of-Way
Bone Creek Basin Fire ES&R[1]	Rehabilitation efforts following wildland fire	Steens CMPA	EA on hold pending completion of this EA	Emergency Stabilization and Rehabilitation
North Kelly Field Mine	Active open pit mining and operations on 512 acres	Celatom Mining area	Expected in 2016	Mining
Eagle Picher Mine	Open pit mining and operations on 286 acres	Celatom Mining area	Authorized in 2012, Unknown operational date	Mining
Harney Electric Power Pole clearing	Vegetation clearing (using Weed Blast and SpraKil) around all Harney Electric Power Poles	Burns District	Request received in Spring of 2015 / Decision expected in Fall of 2015	Right-of-Way

1. The invasive plant treatments in these EAs are included in the No Action and Proposed Action Alternatives. These EAs are listed because other projects, and potentially even other herbicides, are included in these EAs.

Invasive Plants

Issues

- How would the alternatives reduce the spread of noxious weeds and other invasive plants?
- How would the alternatives respond to a tendency for some populations of invasive plants to develop resistance to an herbicide?
- How would the alternatives affect the introduction of invasive plants where prescribed fire has been used as a resource management tool?
- How would the alternatives affect BLM's cooperators who have an invasive plant control program?

Affected Environment

The susceptibility of plant communities to infestation by invasive plants is influenced by many factors, including community structure, proximity to currently infested areas, and the biological traits of the invading species. In general, vegetation types with frequent gaps in plant cover, such as sagebrush-steppe rangelands, woodlands, and dry forests, are more susceptible to invasive plant establishment, than vegetation types with relatively closed plant cover.

Existing Documented Sites (Category 1)

The Burns District has 23 invasive plant species[43] occupying approximately 26,000 acres in approximately 6,856 separate documented locations (see Table 2-1, *Summary of Documented Invasive Plant Sites*). These sites are primarily located along roads, in riparian areas, wetlands, recreation sites, range water development sites, and previously disturbed areas.

Most Category 1 invasive plant sites on the Burns District are relatively small (see Table 3-4, *Summary of Invasive Plants by Infestation Size*). The invasive plant species receiving the greatest amount of treatment are those with the largest sites (more than 1,000 acres) - bull, Canada, and Scotch thistles (see Appendix E, *Invasive Plant Species Infestation Size*).

Table 3-4. Summary of Invasive Plants by Infestation Size

Infestation Size (in Acres)	**Number of Sites** *(percent of total sites)*		**Total Acres** *(percent of total acres)*	
< 0.001	1,659	*24%*	1.02	*<1%*
0.001 -0.099	3,915	*57%*	73.73	*<1%*
0.1 - 0.49	508	*7%*	122.33	*<1%*
0.5-0.99	126	*2%*	93.87	*<1%*
1 - 4.99	340	*5%*	815.37	*3%*
5 - 19.99	174	*3%*	1,671.31	*6%*
20 - 99.99	99	*1%*	4,012.69	*15%*
100 - 499.99	28	*<1%*	5,620.03	*22%*
500 - 999.99	5	*<1%*	4,149.76	*16%*
> 1,000	3	*<1%*	9,433.83	*36%*

Relevant to this analysis, the District currently treats two spotted knapweed infestations (0.02 acres and 0.22 acres) in a remote location in the Steens Wilderness (close to the eastern rim of Wildhorse Creek). These sites are addressed in the *Special Management Areas* section later in this Chapter.

Spread from Existing Sites (Category 2)

The current spread rate for noxious weeds is estimated to be about 12 percent annually (USDI 2010a:133 & 594).[44] and new sites are found on the District with each invasive

[43] Not counting invasive annual grasses medusahead rye, cheatgrass, and ventenata, which are discussed below.
[44] The 2010 Oregon FEIS examined a variety of sources and concluded the spread rate for noxious weeds in Oregon was about 12 percent (USDI 2010a:594-5). Since available herbicides and other control methods have been essentially constant for 30 years, the 12 percent spread rate is assumed to apply to the No Action Alternative.

plant survey. Routes of invasive plant spread on the District include roads and mineral material sites (see Map 2-2), utility corridors and water developments (see Map 2-3), recreation sites and waterways (see Map 2-4), and prescribed fire (see Map 2-5) as well as by wind, water, animals, and humans through vehicle and foot traffic.

Invasive plants can spread quickly and over great distances because they are transported by several means: on off-road and other vehicles, camping and other recreation equipment (including contaminated ATVs), hay and other feed crops, construction equipment, gravel, wind, as intentionally moved plants, or inadvertently within the soils of other transplanted vegetation (USDI 1996). Livestock, wild horses, and wildlife can introduce invasive plant seeds from their coats and feces. Linear disturbances such as roads and fences can serve as corridors for invasive plant spread (USDI 2010a:132). Some invasive plant species such as Mediterranean sage and diffuse knapweed are often found along fences, against sagebrush, or in narrow canyons because they have the ability to break off from the root crown and tumble across the rangelands, often several miles from the original site. Infestations begin mostly on disturbed sites such as roads and trails, firebreaks or burned areas, wildlife or livestock concentration areas, and recreation sites. Hoof action by large herbivores like cattle and wild horses can contribute to invasive plant establishment by exposing bare soil and by selectively removing plants that are more palatable (which reduces competition for invasive plants).

Roads are the primary pathway for spread on the District. However, because roadsides are a priority for surveys, satellite infestations are often found along roads when a single plant has been found. **Recreation sites** (especially developed sites) are also at risk: recreation sites bring together the routes of invasive plant spread, people and recreation equipment, and usually water. Invasive plants can be easily transported from the site to other areas on the District and beyond by the public on their equipment, clothing, and pets.

Mineral material sites and mines can become invasive plant vectors because they are continuously disturbed, and may have numerous users. Following productive use, reclamation may be partial. Because the soil was completely disturbed,[45] primary succession may need to occur and seeded species can be the only vegetation for long periods. It is difficult to keep invasive plants out, because the site will persist in a low seral stage for many years. There are 11,136.3 acres of mineral material sites (153 sites) on the District. Reclamation is conducted when use ends and the District collects a reclamation fee from users. They are monitored for invasive plants and treated as needed. A total of 1,600 acres have been authorized for mining over the next 50 years in the Celatom Mining area.

Fuels reduction projects use mechanical or fire treatments to remove combustible vegetation to reduce the risk of wildfires. Recent projects implemented on the Burns District are shown in Table 3-5. Prescribed fire treatments can leave more severely scorched areas that are susceptible to invasive plants, notably cheatgrass. These severely burned acres are seeded with desirable grasses as a standard practice for every prescribed burn. Prescribed burning is not planned in medusahead rye infestations; however, medusahead rye is sometimes found following these projects. Brush mowing (fuel breaks) removes the overstory of sagebrush, exposing the understory of cheatgrass to proliferate in the mowed strips. Re-seeding or green stripping is currently not allowed in the applicable brush mowing EA. It is difficult to quantify the amount or rate of invasive plants spreading from the above fuel treatments in terms of acres or percentage of the landscape affected. The factors of spread are highly variable. The amount of pre-existing invasive plants, on-site precipitation, prescribed burn severity, track disturbance, slope, aspect, and seed viability all have contributing influences from site to site.

Table 3-5. Hazardous Fuels Program Summary, by Acres

Year	Thinning	Machine Pile	Hand Pile	Brush Mowing	Seeded	Pile Burn	Prescribed Burn	Total
2005	5,834	1,857	764	1,500	4,615	1,130	5,441	17,679
2006	3,351	316	1,265	2,550	14,230	348	9,045	21,495
2007	1,863	165	12	1,400	26,479	1,359	5,687	10,811
2008	5,043	767	115	0	17,996	2,077	5,711	14,428
2009	3,351	1,145	237	0	6,327	179	23,321	31,066

[45] Mining and use of locatable, salable, and leasable minerals often removes vegetation and top soil.

Year	Thinning	Machine Pile	Hand Pile	Brush Mowing	Seeded	Pile Burn	Prescribed Burn	Total
2010	2,781	2,735	771	0	2,348	1,805	15,970	24,062
2011	2,068	2,524	75	0	5,328	2,500	12,796	21,363
2012	2,647	412	347	0	4,295	3,000	8,941	15,347
2013	367	167	200	0	32,286	3,000	4,131	7,865
2014	4,141	1,064	1,420	759	7,916	2,500	11,020	20,904
Planned 2015	2,623	1,371	1,352	0	2,200	2,200	4,901	14,647

New Invaders (Category 3)

Invasive plants that have not formerly been identified on the District are considered "new invaders." New invaders could be present on adjacent lands before they spread onto the BLM-administered lands. For example, the largest infestation of African rue in Oregon is present in the Harney Basin, but has yet to be detected on BLM-administered lands. The District works with the Harney County Cooperative Weed Management Area (CWMA), a partnership that helps coordinate invasive plant-related projects across jurisdictional boundaries and educate the public about new invasive plants that are invading the area.[46]

Second only to prevention methods in effectiveness, Early Detection / Rapid Response (EDRR) strategies that identify and treat invasive plant infestations while they are very small can prevent infestations from spreading and causing adverse impacts to many resources. The Burns District has an on-going agreement with Harney County to use the Strategic Weed Attack Team (SWAT) to survey and treat small infestations of invasive plants on thousands of acres each year.

Invasive Annual Grasses (Category 5) and Post-Fire Emergency Stabilization and Rehabilitation Areas (Category 4)

Invasive annual grasses (including medusahead rye and cheatgrass) occupy hundreds of thousands of additional acres (Category 5). Medusahead rye is the most problematic of the annual grasses on the District. Where infestations have become well established, they tend to be very dense. These "core" infestations tend to be surrounded by a halo of low to moderate infestation that can be quite extensive. Existing sites are spreading at the edges, and new satellite populations are created by seed and other propagules.

There are many unquantified infestations of invasive annual grasses on the Burns District. The District has identified specific areas where medusahead rye is prominent as well as areas at risk for medusahead rye invasion (see Maps 2-7). Treatments designed to prevent spread from medusahead rye-infested landscapes into adjacent or other uninfested areas is an important priority for the Burns District. Estimates from BLM Ecological Site Inventory (ESI) show more than 775,000 acres where cheatgrass is recorded as the dominant understory grass. Input from District specialists and other data describes tens of thousands of additional acres of invasive annual grasses prominent within recently burned areas where the ESI is outdated. Cheatgrass is present throughout the District, ranging from low density to monoculture. Where densities are high, there is an increase in the frequency and severity of rangeland wildfires, which in turn threatens sagebrush and other native habitats, and promotes further spread of invasive annual grasses (Whisenant 1990, Miller and Tausch 2001, Pellant et al. 2004, Chambers et al. 2007). Since the 2010 Oregon Vegetation Management EIS was completed, approximately 24,000 acres of treatments of invasive annual grasses have been conducted (see Table 2-8, *Annual Treatment Summary*), primarily where large-scale wildfires have occurred (Category 4). Treatments have focused on 1) areas with adequate desirable vegetation to respond positively to the treatment; 2) treating buffers along roads to prevent spread and to break the landscape up into more manageable treatment units; and 3) to protect and enhance areas that were seeded following the fires. Most of these treatments have been on medusahead rye infestations but approximately 6,700 acres were on cheatgrass.

[46] See *Prevention, Detection, Education, and Awareness* section early in Chapter 2 for more information about the CWMA.

Cooperators

The Burns District works cooperatively with the Grant and Harney County Cooperative Weed Management Areas. The District works particularly closely with Harney County, where grants and BLM contributions help fund the Strategic Weed Action Team (SWAT) for Early Detection/Rapid Response (EDRR) and roadside treatments. In fiscal year 2013, SWAT work included 23,869 acres of inventory, 110 acres of invasive plant treatments, and 236,072 acres of monitoring. The BLM also participates in multiple landowner projects coordinated with the CWMA, such as a 2012 15,646-acre medusahead rye control treatment using helicopters that was half on BLM administered lands and half on private lands. Most of the off-District education and awareness events that the District participates in were coordinated through the CWMA.

The District also coordinates activities with local, State, and Federal agencies, tribal governments, and private landowners. Coordination includes the implementation of prevention and education activities, sharing of inventory and monitoring information, research, and developing treatment programs.

The District also coordinates the management activities of permittees and others with a responsibility to control invasive plants in their permit areas. District personnel meet annually with the Oregon Department of Transportation, for example, to discuss and plan highway rights-of-way invasive plant treatments and associated BLM reporting requirements.

Environmental Consequences

Effects of Treatment Methods on Invasive Plants

Non-Herbicide Treatments

Manual methods (such as pulling, digging, and grubbing invasive plants) can be used to control some invasive plants, particularly if the population is relatively small. Grubbing is often used when a single invasive plant is found. These techniques can be target-specific, minimizing damage to adjacent desirable plants, but they are labor and time intensive. Treatments must typically be administered several times annually to prevent the invasive plant from re-establishing, which makes manual treatments of invasive plants in remote locations unpractical. In the process, laborers may trample vegetation and disturb soil, providing isolated but prime conditions for re-invasion by the same or other invasive plants. Manual techniques can be used in combination with other techniques; for example, when shrubs or trees are pulled or cut and stumps, re-sprouts and / or seedlings treated with herbicides (Tu et al. 2001, USDI 2010a:73).

Mechanical methods include weed whackers, chainsaws, and mowing. Some of these methods (e.g., chainsaws and weed whackers) can be more target-specific than others; all methods share some of the drawbacks that manual methods do (e.g. need of repeat treatment, disturbed vegetation and soil disturbance that can promote invasive plants, disturbance to non-target species, etc.). Weed whacker and mowing methods are common in recreation sites, as the area would not need to be closed for re-entry intervals as they might with herbicide application. These techniques are also used at communication, storage, and administrative sites (such as guard stations, Riddle Brothers Ranch Historic Site, and Fields Administrative site) to prevent invasive plants from becoming a fire hazard. When using mechanical and manual methods, all equipment and clothing is cleaned and inspected before being moved off-site. This lessens, but does not eliminate, the possibility of spreading invasive plants to the next worksite (USDI 2010a:74). The District's *Weed Prevention Schedule* (Appendix H) guides the staff on how to prevent invasive plant spread.

Cattle, sheep, and goats can be trained and acclimated to select noxious weeds, including all those known on the Burns District (Voth 2010). Targeted livestock grazing can reduce invasive plant abundance and / or vigor at a

particular site. However, grazing will rarely, if ever, eradicate invasive plants. Employing grazing prescriptions may be useful in areas with limited access, severe slopes, or where herbicides cannot be applied. As with many other treatments, targeted livestock grazing can be most effective when used in combination with other treatments (USDI 2010a:75). Cattle are currently being used for targeted grazing of invasive annual grasses on the Burns District. Cattle readily eat cheatgrass in the spring and winter when it is palatable. Medusahead rye appears less palatable than cheatgrass because it has courser awns and concentrates silica. Nevertheless, a winter grazing trial on the Burns District showed that, with protein supplementation, cows would select medusahead rye and cheatgrass over native bunchgrasses and crested wheatgrass in fall and early winter. Invasive annual grasses may also be preferred cattle forages between fall through early spring when they are green and before seed production. From 1997 to present, the Burns District has been involved in cooperative targeted grazing research projects on private lands using goats. Target invasive plants have included leafy spurge (in Malin, OR), Russian knapweed (Harney County, OR), and blackberries (Jackson County, OR). Utilizing targeted goat grazing on perennial rhizomatous invasive plants such as leafy spurge, Russian knapweed, and perennial pepperweed, in conjunction with follow-up herbicide treatments and restoration of non-invasive vegetation[47] can provide much better management of the target invasive plants than any treatment by itself. Typically, a full-time herder is required to keep the grazing focused on the target areas and species. At this time, there are no appropriate invasive plant infestations on the District where sheep or goats would be used for targeted grazing treatments. Should the need arise in the future, the locations would be coordinated with Oregon Department of Fish and Wildlife (ODFW) as described in the Andrews Resource Management Plan, to minimize the risk of introducing disease to big-horn sheep herds (see *Recommendations for Domestic Sheep and Goat Management in wild Sheep Habitat* by the Western Association of Fish and Wildlife Agencies (Wild Sheep Working Group 2012:11-16)). Targeted grazing[48] is also used to manage invasive annual grasses after wildfire.

Biological control agents[49] are host specific organisms (mostly insects but can be nematodes, mites, or pathogens) that target noxious weeds and reduce their reproduction and vigor. Seven biological control agents are currently active on seven different noxious weeds on the Burns District. One hundred and twenty releases have been made on invasive plant species in the District over the past 24 years (see Table 3-6 and Map 3-1). Biological control agents typically help keep the target plants in balance where they occur in their native landscapes. Absence of these natural community controls is often what allows invasive plants to spread and become invasive in their new environments. Most of the species used for biological control are extremely host-specific and are not known to attack non-target species. Biological controls will seldom remove an invasive plant population entirely, but can dampen its reproduction, spread and extent, and keep it in some sense of balance compared to other plants in that community. Biological controls are usually acquired from the same ecosystems from where the target invasive plant originated, and are vigorously tested by the Federal Animal and Plant Health Inspection Service to ensure that they are not likely to become pests themselves. The Oregon Department of Agriculture's Noxious weed Control Program coordinates releases and monitors populations. On the Burns District, since the biological control agents are not successful unless there are enough invasive plants for them to feed upon, typically only large infestations are targeted. Once large populations become unmanageable, other methods of control are not always economical or physically possible. To date, the most successful biological controls on the Burns District are *Mecinus janthinus*, a root-mining weevil that targets Dalmatian toadflax; *Ceutorhynchus litura*, a stem-mining weevil that targets Canada thistle; and *Larinus minutus*, a seed-eating weevil that targets diffuse knapweed.

[47] Seeding and planting can be used to control invasive plant problems by establishing the desired plant species, particularly when other treatment methods cause ground disturbances that would attract invasive plants. However, because most invasive plant control sites are expected to retain enough existing desirable vegetation to reclaim the site, and because seed species mixes for other sites is unknown, seeding and planting would be subject to additional NEPA compliance documentation.
[48] However, permitted use grazing is prohibited after wildfires until goals for rehabilitation are met.
[49] Also referred to as biocontrols.

Table 3-6. Biocontrol Releases

Biocontrol	Target	Number of releases																	Total
		pre-2000	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	unknown	
Stem mining weevil *Ceutorhynchus litura*	Canada thistle	1											2	1	1	1	1		**7**
Stem gall fly *Urophora cardui*	Canada thistle	4	6	2	9	1	3												**25**
Stem mining weevil *Mecinus janthinus*	Dalmatian toadflax				2	16	6	2	3	11	9	8			2			3	**62**
Seed feeding weevil *Larinus minutus*	diffuse knapweed	1					2	2			3	5			4			1	**18**
Leaf and bud galling mite *Aceria malherbae*	field bindweed				1							1							**2**
Defoliating moth *Agonopterix alstroemeriana*	poison hemlock	1																	**1**
Foliar feeding beetle *Galerucella pusilla*	purple loosestrife						5												**5**

Mecinus janthinus introductions began in 2002 and are now widespread across the northeast portion of the District. Historically, Dalmatian toadflax was widespread in this area and expanding. The District has actively participated in collections and redistributions of acclimated agents in addition to establishing new populations in the County. The BLM considers Dalmatian toadflax "managed" at an acceptable level on the District.

Larinus minutus was first released in Harney County in 1999 at the Radar Base west of Burns / Hines. Releases on BLM land began in 2004. Releases have been made on both BLM-administered lands and adjacent private lands (where the infestation of diffuse knapweed is particularly heavy), and one of the primary target locations for BLM is along the east side of Steens Mountain, in habitat for the federally listed Lahontan Cutthroat Trout. The BLM currently treats the diffuse knapweed along the road network with herbicides to prevent spread but does not treat the infestations in the rangeland to give the biocontrol agent an opportunity to establish.

Ceutorhynchus litura was first released in Harney County in 1990 on the Malheur Wildlife Refuge. It was not actively released on BLM until 2010. It is proving quite effective for treating Canada thistle infestations along riparian corridors where the infestations are particularly heavy. Burns District considers this biocontrol agent to be our primary treatment method for Canada thistle in these riparian situations.

The Burns District may use prescribed fires for invasive plant control. This could happen when the target invasive plants have gone to seed and there is a need to remove that seed source. This type of treatment would only be warranted occasionally (on the order of a few times a decade). Consideration would be given to impacts on associated resources and the ability to contain the fire to the treatment area. In addition to removing invasive plants, this can also help reduce the seed bank.

Herbicide Treatments

The effects of herbicides on invasive plants are listed on Table 3-7.

Table 3-7. Effects of Herbicides (Invasive Plants)

Herbicides available under both alternatives	
2,4-D	2,4-D is effective on a wide range of broadleaf invasive plant while not affecting most grasses. While having additional herbicides available can allow for more target specific control, having one herbicide that controls a vast range of vegetation can reduce operator error that can occur while mixing and applying herbicides. In addition, adding 2,4-D to a tank mix can improve the effectiveness of the other herbicides and reduce the likelihood of a population developing resistance 2,4-D can curtail seed production, prevent herbicide resistance, and effectively treat multiple invasive plant species when a variety are encountered in a particular treatment area. The amount of 2,4-D used in combination with clopyralid, chlorsulfuron, and metsulfuron methyl would vary, based on these factors. The amount of 2,4-D used in conjunction with picloram and dicamba would likely not vary, as 2,4-D generally would function as the primary effective treatment in such tank mixes.
Dicamba	Dicamba has been used extensively on thistles and in combination with 2,4-D on mustards (including perennial pepperweed), as it has been the most effective control for those species under the No Action Alternative. However, 2,4-D + dicamba doesn't control existing mustard plants: it reduces seed set, which controls the spread but generally not the existing populations. Use would drop under the Proposed Action, and chlorsulfuron and metsulfuron methyl would be used for many of these treatments. Dicamba generally provides effective control right up to seed set, which extends the treatment window. It is also the most effective product (in combination with chlorsulfuron) for control of curly dock.
Glyphosate	Glyphosate is effective on broadleaf invasive plants and woody species and has been used to treat medusahead rye on the District. It is a non-selective herbicide and can harm desirable plants.
Picloram	Picloram is effective on knapweeds, toadflax, Mediterranean sage, and thistles. It 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 limited areas under the No Action Alternative and District-wide under the Proposed Action	
Chlorsulfuron	Chlorsulfuron is an ALS-inhibitor that is 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 effective on 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 2012 (see Table 2-7: *Summary of NEPA Covering the No Action Alternative*)
Sulfometuron methyl	Like imazapic, sulfometuron methyl, an ALS-inhibitor, is effective on cheatgrass and medusahead rye and can be selective for annuals at low rates. It has a shorter half-life than imazapic, which speeds restoration efforts. At typical and maximum rates, sulfometuron methyl would control many annual and perennial grass and broadleaf species. It is not appropriate for large-scale treatments on rangelands because it is not labeled for use on rangelands (unless it is combined with chlorsulfuron in *Landmark*), cannot be applied aerially, and has a one-year grazing restriction following application.
Herbicides available under the Proposed Action	
Dicamba + Diflufenzopyr	Diflufenzopyr + Dicamba is effective of many of same species as dicamba. It can be used in a mixture with picloram, triclopyr, and clopyralid, allowing for a reduced rate of those herbicides.
Fluridone	Fluridone is an aquatic herbicide that requires prolonged plant contact, so it can only be used on aquatic plants in still water. There are currently no invasive aquatic plants on the District. If the need arose, treatments would be contracted out to applicators with experience in this type of application.
Hexazinone	Hexazinone is effective on annual grasses. It could also be used to treat new invaders to the District where appropriate. Common targets could include invasive annual grasses and broadleaf plants. It might be an additional herbicide for medusahead rye on rangelands, possibly tank-mixed at low rates with imazapic.
Imazapyr	Imazapyr is an ALS-inhibitor that is very effective on brushy and woody species such as saltcedar and Russian olive. It is also used to treat African rue, Japanese knotweed, and leafy spurge. Imazapyr may be used for the control of aquatic invasive plants in and around standing and flowing water, as well as in riparian / wetland settings.

Metsulfuron methyl	Metsulfuron methyl has similar targets and effects as chlorsulfuron, but can cause more harm to desirable meadow grasses. It could be used on perennial pepperweed, whitetop and other mustards, as well as thistles, Mediterranean sage, and houndstongue.
Triclopyr	Triclopyr is effective on woody plants, and would be used on saltcedar, Russian olive, and other shrubs. The aquatic formulations are also the most effective herbicide for treatment of purple loosestrife. Triclopyr BEE, the ester formulation, is more effective at smaller doses, but is toxic to fish. It is often used as a cut-stump treatment, in addition to foliar applications.

In addition to the effects of the herbicides themselves, the application methods may have unintended adverse effects: similar to manual and mechanical treatments, laborers applying herbicides or ATVs carrying herbicides and laborers may trample vegetation and disturb soil, which can cause the further spread of invasive plants. Treatment methods that include herbicides are less likely to need retreatments; in Oregon FEIS, overall treatment efficiency was estimated at 30 percent if herbicides were not used (USDI 2010a:135-137).

Effects by Alternative

No Action Alternative

Continued use of 2,4-D, dicamba, glyphosate, picloram, and selected use of chlorsulfuron, clopyralid, and imazapic, along with non-herbicide methods would continue to slow the spread of State, Federal, or County-listed noxious weeds within the District. However, certain noxious weeds and most of the other invasive plants would continue to spread. For example, the spread of perennial pepperweed and whitetop can be slowed but not adequately controlled; available treatments for these species only reduce the vigor or delay seed development. Invasive annual grasses (including medusahead rye) cannot be effectively treated because there is not an herbicide available District-wide that is selective to these grasses. Treatments under this alternative are estimated to effectively control small populations about 60 percent of the time (USDI 2010a:136),[50] and at the current 12 percent annual spread rate, the 26,000 acres of documented Category 1 sites (see Table 2-1, *Summary of Documented Invasive Plant Sites*) would be expected to spread to approximately 127,000 acres in 15 years. Cooperative partners within the District (such as Harney County CWMA) find projects with the BLM to be difficult because many of the herbicides are not available for use on BLM-administered lands. Herbicides would be used as a follow up or maintenance treatment to mechanical or prescribed fire treatments or post wildfire rehabilitation treatments, to further reduce the fuels hazard and to help control new or existing invasions from occurring or spreading.

Herbicide resistance[51] is the evolved capacity of a susceptible invasive plant population to withstand an herbicide application and complete its lifecycle. Where invasive plant infestations have been sprayed annually with the same herbicides with low likelihood of eradication, a concern is that plant populations could become herbicide resistant. Most plant populations showing herbicide resistance are in agriculture settings; however, resistance has been documented in wildland vegetation management settings and invasive plant programs. Resistance can result from repeated use of the same herbicides, or several herbicides with the same site of action. Given the four herbicides available District-wide from which to choose in the No Action Alternative, herbicide resistance is much more likely.

The Oregon FEIS estimated that the efficiency of treatments would be 60 percent under a noxious weed program with four herbicides (USDI 2010a:135-137).

[50] Primarily because the currently available treatment methods (including four herbicides) do not kill or effectively control certain species, like perennial pepperweed, whitetop, and Canada thistle.

[51] Herbicide resistance is the inherited ability of a plant to survive an herbicide application to which the original populations were susceptible. Naturally resistant plants occur within a population in extremely small numbers (somewhere between 1 in 100,000 to more than 1 in 1,000,000). They differ slightly in genetic makeup from the original populations, but they remain reproductively compatible with them. The repeated use of one herbicide, or of herbicides that kill the plants the same way (same mechanism or site of action), allows these few plants to survive and reproduce. The number of resistant plants then increases in the population until the herbicide no longer effectively controls it.

Proposed Action

The wider range of herbicides from which to choose would increase the effectiveness of the average treatment to an estimated 80 percent (USDI 2010a:136). Although some level of retreatment would still take place, the additional herbicides would improve the chances that invasive plants would be controlled with fewer retreatments (USDI 2010a:135-136). With additional herbicides available, this alternative could effectively control all of the types of invasive plant species known to be within the District, as well as provide control of cheatgrass and other invasive annual grasses needed for habitat protection. Non-herbicide methods could be more focused where they are most reasonable and effective, or used in conjunction with herbicides. Using spread calculations developed for Alternative 3 in the 2010 Oregon FEIS, (the alternative nearly identical to the Proposed Action in this EA), the 26,000 acres of documented sites (Category 1) are predicted to spread to 86,800 acres over 15 years, or 40,200 acres less than under the No Action Alternative (USDI 2010a:594-596, Table A7-4). The annual spread rate is estimated to decrease to seven percent over that same period (ibid). As in the No Action Alternative, herbicides would be used as a follow up or maintenance treatment to mechanical or prescribed fire treatments or post wildfire rehabilitation treatments, to further reduce the fuels hazard and to help control new or existing invasions from occurring or spreading.

The more selective herbicides chlorsulfuron and metsulfuron methyl could be used to effectively control the perennial mustards that the District has been treating for 20 years (see Table 2-10, *Treatment Key*). In combination with clopyralid, infestations of Canada thistle, Mediterranean sage, and houndstongue can be treated with minimal damage to desirable vegetation.

With the addition of the herbicides imazapyr and triclopyr, species such as tamarisk, Russian olive, and purple loosestrife could be controlled in riparian / wetland settings. The District would have the ability to better manage species currently unknown but with the potential to invade (Category 3). The herbicides listed above, along with fluridone would allow control of invasive aquatic plants as well. Yellow flag iris, water primrose, and yellow floating heart, along with Elodea, hydrilla, and Eurasian watermilfoil have become more common across Oregon, but have not been found on the District.

Imazapic, hexazinone, and sulfometuron methyl would be used as pre-emergents to prevent invasive annual grass species as part of post-fire emergency stabilization after large catastrophic fires (Category 4) along with seeding[52] and other emergency stabilization efforts. The addition of these herbicides would give the District the ability to manage medusahead rye, an invasive annual grass species, where it has become problematic. Infestations are still relatively small in a number of areas such as the East Steens and east of Page Springs Campground but there are vast expanses of rangeland at risk for invasion. Treatments with these herbicides along roads where invasive annual grasses are prominent would break up the landscapes and reduce the likelihood of sweeping unchecked wildfires that also adversely affect Greater sage-grouse habitat. Imazapic treatments designed to reduce invasive annual grass populations benefit sage-grouse Preliminary Priority Habitat and Preliminary General Habitat. The U.S. Fish and Wildlife Service identified invasive plants, especially annual grasses, and shortened fire-return intervals as a threat to sagebrush / forb plant communities in their *12-Month Finding for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered* (75 Federal Register 13910, March 23, 2010). Treatments would help provide and protect successful nesting and reproduction habitat.

The use of additional herbicides would help prevent herbicide resistance by adding chemicals that control the plants through different modes of action. The additional herbicides available under this alternative would permit more effective rotation of herbicides, that when coupled with integrated invasive plant management, would help prevent the development of herbicide resistance (see Table 3-8). Many of the ALS-inhibitors (such as chlorsulfuron and metsulfuron methyl) recommend tank-mix partners and / or sequential herbicide application that have different mechanisms of action.

[52] Seeding is not analyzed as part of this EA.

Table 3-8. Guide for Herbicide Rotation[1]

Herbicide Group	Herbicide Chemical Family	Herbicide Common Name	Resistant Plants	States with Resistant Plants
ALS Inhibitors	Imidazolinones	Imazapic	None	None
	Imidazolinones	Imazapyr	None	None
	Sulfonylureas	Chlorsulfuron	prickly lettuce kochia[2] Russian thistle Italian ryegrass mayweed chamomile small-seed false flax	Idaho, Oregon, Washington Idaho, Oregon, Washington Idaho, Oregon, Washington Oregon Idaho, Washington Oregon
	Sulfonylureas	Metsulfuron methyl	Pprickly lettuce kochia[2] Russian thistle small-seed false flax	Idaho, Oregon Oregon Oregon Oregon
	Sulfonylureas	Sulfometuron methyl	None	None
Synthetic auxins	Phenoxy acetic acids	2,4-D	prickly lettuce	Washington
	Benzoic acids	Dicamba	kochia[2] prickly lettuce	Idaho Washington
	Pyridines	Clopyralid	none	None
	Pyridines	Picloram	yellow starthistle	Washington
	Pyridines	Triclopyr	None	None
ESPS synthase inhibitors	Glycines	Glyphosate	Italian ryegrass	Oregon

To avoid selecting for herbicide-resistant invasive plants, rotate to a different group every year if possible. Avoid using herbicides from the same group more than once every three years.
1. Adapted from *Herbicide-resistant Weeds and Their Management* (University of Idaho 2011)
2. Refers to *Bassia scoparia*, also known as *Kochia scoparia*.

The Oregon FEIS estimated that the efficiency of treatments on noxious weeds would be 80 percent with additional herbicides available (USDI 2010a:135-137).

Cumulative Effects

Common to Both Alternatives

As described in the *Spread from Existing Sites (Category 2)* section above, many on-going District activities such as recreation, prescribed burning, mining (including the transport of mineral materials around the District), and fuel break mowing have the potential to inadvertently introduce invasive plants and facilitate establishment when soil and vegetation are disturbed. This invasive plant spread is reduced not just by treatments described in the alternatives, but also by the prevention measures described early in Chapter 2. The Burns District has a Weed Prevention Schedule that prescribes prevention measures for various programs and activities. Additionally, risk assessments are done on proposed projects and prevention measures prescribed (USDI 1992b). The risk assessment considers the likelihood and consequences of invasive plant introduction and spread. If the risk is moderate or high, the project is modified and / or monitoring is required. Even with these measures in place, it is likely that introduction and spread of invasive plants would continue.

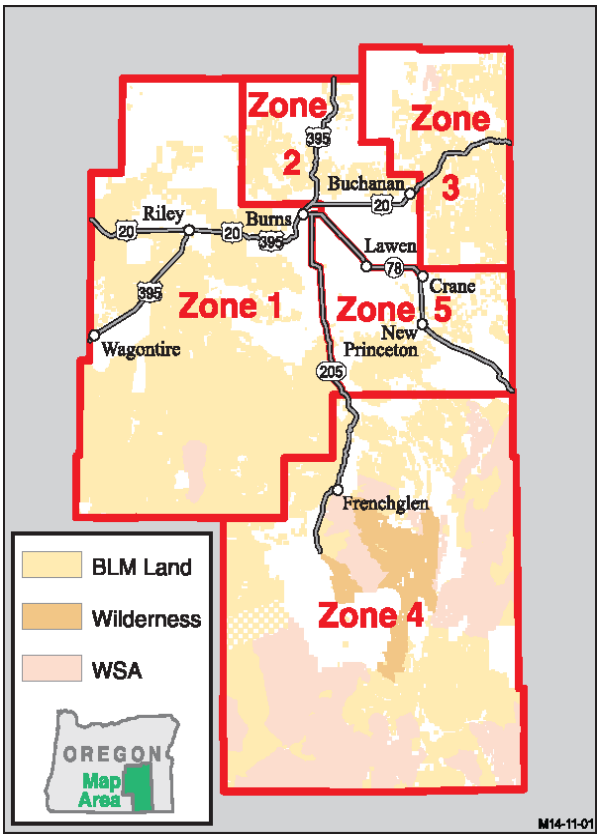
The BLM works closely with Harney County CWMA to control invasive plants on adjacent lands. Treatments taking place off BLM-administered lands are shown on Table 3-9 and Figure 3-2.

Table 3-9. Harney County Cooperative Weed Management Area Projects

Project Zone	Year	Project Title	Targeted Invasive Plants	Acres Treated
2	2014	Poison Creek Knapweed Follow-up	spotted knapweed	35
5	2014	Now Happy Valley #2	perennial pepperweed, whitetop, Scotch thistle	350
2	2013	Poison Creek Knapweed	spotted knapweed	45
3	2013	Stinkingwater Creek Noxious Weed Project	purple loosestrife, Russian knapweed, perennial pepperweed, scotch thistle	230
4	2013	Southern Alvord Follow-up	perennial pepperweed, Russian knapweed, Scotch thistle	300
5	2013	Now Happy Valley	perennial pepperweed, whitetop, Scotch thistle	1,130
1	2012	Riley Noxious Weed Inventory	perennial pepperweed, Russian knapweed, diffuse knapweed, Scotch thistle	*Inventory*
3	2012	Otis Valley Noxious Weed Project	perennial pepperweed, Russian knapweed	450
4	2012	Southern Alvord Basin Noxious Weed Project	perennial pepperweed, Russian knapweed, Scotch thistle	821
1	2011 / 2012	EQIP Medusahead Inventory in Riley Area	Medusahead rye	*Inventory*
3	2008	South Fork Malheur River Pepperweed Duce	perennial pepperweed	224
3	2007	South Fork Malheur River, Crane & Riverside	perennial pepperweed	304
1	2006	Burns-Hines Weedy Project	Scotch thistle, spotted knapweed, diffuse knapweed, perennial pepperweed	180
2	2006	Rattlesnake-Buchanan Weed Stomp	perennial pepperweed	1,195
4	2006	Cottonwood Ranch Russian Knapweed Project	Russian knapweed	535
All	2006	Access and Habitat Grant for Spray Equipment		unknown
3	2005	Drewsey Whitetop Project	whitetop	540
4	2005	Alvord Lake Sub Basin Cooperative Weed Management Project	Scotch thistle, spotted knapweed, diffuse knapweed, Russian knapweed, yellow starthistle, puncturevine, perennial pepperweed	2,933
5	2005	Crane / Drewsey Attack on Medusahead	medusahead rye	Unknown
1	2004	Silver Creek Watershed Invasive Mow Down	Russian knapweed, Dalmatian toadflax, perennial pepperweed	2,720
2	2004	Silvies River Corridor Cooperative Resource Enhancement & Weed Management	Russian knapweed, spotted knapweed, Dalmatian toadflax, whitetop, perennial pepperweed	443.25
4	2003	Diamond Mow Down	Russian knapweed, perennial pepperweed, saltcedar, Russian olive, reed canarygrass, scotch thistle	Unknown
1	2002	Gap Ranch Russian Knapweed Project	Russian knapweed	600
2	2002	Front Range Dalmatian Toadflax Project	Dalmatian toadflax	38.25
1	2001	Harney County Invasive Weed Project	Russian knapweed, Dalmatian toadflax, Scotch thistle, spotted knapweed	Unknown
2	2001	Harney County Invasive Weed Control Project	Russian knapweed, Dalmatian toadflax, Scotch thistle, spotted knapweed	Unknown
3	2001	Malheur / Owyhee Watershed Invasive Weed Control & Restoration Project	yellow starthistle, rush skeletonweed, spotted knapweed	3,000
4	2001	Harney County Invasive Weed Control Project	Russian knapweed, Dalmatian toadflax, Scotch thistle, spotted knapweed	Unknown
5	2001	Harney County Invasive Weed Control Project	Russian knapweed, Dalmatian toadflax, Scotch thistle, spotted knapweed	Unknown
3	2000	South Fork Malheur River Pepperweed	perennial pepperweed	Unknown

No Action Alternative

Figure 3-2. Harney County CWMA Zones



The limited effectiveness of the four herbicides available under the No Action Alternative can exacerbate invasive plant problems on adjacent lands, thus increasing the need for herbicide use on those lands (potentially affecting BLM resources) and frustrating adjacent landowner control efforts so infestations grow and contribute back to the BLM problem (see *Changes in Herbicide Use on Adjacent Non-BLM Lands Resulting From the BLM Alternatives* in the Oregon EIS, USDI 2010a:118).

Proposed Action

Under the Proposed Action the same activities, off-site forces, and Agency policies as the No Action Alternative would occur. The wider array of herbicides and the greater efficacy and selectivity they provide under this alternative would improve the District's ability to manage invasive plants as described in this section. The spread rate of invasive plants is expected to decrease to seven percent once these more effective control measures become available. The Burns District would be able to utilize many of the same products that are used on adjacent lands and be an equal partner in cooperative weed management projects. Overall invasive plant populations would be slowed and herbicide use could decrease, as BLM invasive plant spread is reduced.

Native Vegetation

Issues

- How would the alternatives affect native plant communities?

Affected Environment

The Burns District is on the northwest edge of the Great Basin and is cooler, wetter, and a little more productive than areas of the Great Basin that lie south and east of the District. Like the rest of the Great Basin, the native vegetation is dominated by shrubs, with big sagebrush and low sagebrush as the most common. On the Burns District, two of the main threats to native plant communities are the interrelated problems of invasive annual grasses and altered fire regimes (Hagen et al. 2011). This combined threat is especially critical to the function and integrity of the sagebrush steppe plant community, because the dominant species of sagebrush do not resprout after fire. Burned areas would have reduced sagebrush composition for 10 to 50 years and longer. Healthy sagebrush plant communities are required habitat for several neo-tropical migrant birds, pygmy rabbit (a Bureau Sensitive species), Greater sage-grouse (an *Endangered Species Act* candidate species), raptors, big game animals, game birds, and other native fauna. Table 3-10 shows the large and important component of native vegetation on the District composed of sagebrush plant communities. Of the nearly 3.276 million acres on the Burns District,

3,196,929 acres (85 percent) have or could have native vegetation. Of the vegetated area, 85 percent supports big sagebrush or low sage dominated plant communities. While old growth western juniper occurs on 1,942 acres, it has encroached on thousands of acres of other plant communities.

Table 3-10. Plant Communities[1]

Plant Community	Acres	Percent of Vegetated Area	Description
Vegetated			
Sagebrush Steppe and other shrub dominated communities			
Wyoming big sagebrush shrub / grassland	1,249,174	39%	Most common vegetative type in southeastern Oregon: on higher, cooler sites can occur with other shrubs including, antelope bitterbrush, and mountain mahogany. Common grasses are the typical northern Great Basin bunchgrasses including bluebunch wheatgrass, Thurbers needlegrass, basin wildrye, bottlebrush squirreltail, june grass, and Sandberg bluegrass. Forb composition tends to increase with elevation or moisture, but typically has seasonal expression and low composition (5-15 percent). Forms a mosaic with other plant communities including low sagebrush on "shallow soils" and basin big sagebrush on deeper soils.
Low sagebrush shrub / grassland	730,102	23%	Common throughout eastern Oregon on shallow soils. On the Burns District, low sagebrush includes little sagebrush and black sagebrush. Intermixed with Wyoming and mountain big sagebrush. At lower elevations, the vegetation is widely spaced and may not carry fire except during extreme burning conditions. Vegetation density increases with elevation or moisture. Often in a mosaic with big sagebrush types. Bunchgrasses include bluebunch wheatgrass, Thurbers needlegrass, basin wildrye, bottlebrush squirreltail, june grass, and Sandberg bluegrass. At higher elevations, this community is vulnerable to western juniper encroachment.
Mountain big sagebrush / grassland	462,994	14%	Occurs at higher elevations or wetter sites than Wyoming big sagebrush and shrubs. Grasses and forbs are denser and more abundant. Typically burns more frequently (approximately 30 year intervals) and the sagebrush recovers from burning faster (approximately 10 years). Often intermixed with low sagebrush, mountain shrub, and encroached by western juniper. Bunchgrasses include Idaho fescue, bluebunch wheatgrass, Thurbers needlegrass, june grass, and other needlegrasses. More resistant to invasive annual grasses.
Basin big sagebrush	267,020	8%	Generally, this vegetation type is an inclusion in Wyoming big sagebrush plant communities on deeper soils. The grasses and forbs are similar. Basin big sagebrush intermixed with Wyoming big sagebrush is also vulnerable to invasive annual grasses.
TOTAL (big and low sagebrush)	**2,709,290**	**85%**	
Salt desert shrub / grassland	208,574	7%	Greasewood, shadscale, and fourwing saltbush are dominant late seral shrubs. Bunchgrass species are similar to Wyoming big sagebrush grasses. These plant communities are in salt affected areas primarily around Malheur and Harney Lakes and on the east side of the Steens.
Stiff sage or scabland sage	45,254	1%	Stiff sage occurs on cool moist, but very shallow sites. Sandberg bluegrass is a common grass. Idaho fescue and danthonias may also be present. These sites are relatively unproductive and resistant to invasion.
Silver sagebrush	21,404	<1%	Usually found in and bordering playas or on semi-alkaline flats and valley bottomlands. Basin wildrye is a common grass.
Mountain shrub	37,217	1%	On the District, antelope bitterbrush and mountain mahogany are the most common shrubs with many other shrub species intermixed and a bunchgrass / forb understory. They are often intermixed with mountain big sagebrush, ponderosa pine, or western juniper communities. Vulnerable to western juniper encroachment.

Plant Community	Acres	Percent of Vegetated Area	Description
Seedings	121,891	4%	Seedings on the Burns District were originally fire rehabilitation. Until the 2000s, seedings consisted of crested wheatgrass cultivars or Siberian wheatgrass. More recently, forage kochia has been inter-seeded into existing seedings or been part of the initial seed mix. On the Burns District, the Alkali and Double "O" seedings are used at times as forage banks for livestock during rehabilitation projects on other allotments. The management goal for these acres is to maintain them as seedings. The seedings are mainly in low elevation big sagebrush plant communities. While crested wheatgrass can be competitive with invasive annual grasses, Burns seedings are at elevations and in locations that make them susceptible to invasive annual grasses. Such infestations could be treated with herbicides like native vegetation on the District.
Forests and Woodlands			
Western juniper woodland – old growth	1,942	<1%	Occurs throughout the District on rocky ridges and sites protected from fire. Juniper encroaches into mountain big sagebrush, ponderosa pine, and mountain shrub sites.
Coniferous forest	30,160	<1%	Occurs above 4,500 feet in areas between Highway 20 and the National Forest boundary, Silvies Valley, Stinkingwater Mountains, Steens, Trout Creek Mountains, and Pueblo Mountains. Ponderosa pine is the most common tree species, being more tolerant of warm dry sites than the other species - Douglas fir, white fir, and western larch. White fir can be the dominant conifer at the highest elevations on the District. Supports commercial logging and forest health logging. Vulnerable to western juniper encroachment at lower elevations.
Riparian and Wetland Vegetation			
Aspen	14,660	<1%	Widely scattered at sites with added moisture from snowdrifts and springs and higher elevations. Due to the added moisture, they are more productive and have more forbs and different grass species than surrounding plant communities. Vulnerable to western juniper encroachment.
Herbaceous Riparian	6,537	<1%	Riparian areas have water in the root zones during part of the growing season. They are more productive than surrounding plant communities. They provide habitats for a disproportionately large number of wildlife species. Vulnerable to western juniper encroachment.
TOTAL	3,196,929	100%	
Not Vegetated	136,641		Playas, lava flows, cliffs and rock outcrops

1. From "General Vegetation Types" Burns District GIS layer

Treatments Planned Relating to the Issues

There are two treatment scales on the Burns District. One is treatment of (usually) small patches of Categories 1-3 invasive plants that may be treated with any of the treatment methods available under the alternatives. When herbicides are used, treatments are generally spot spraying or small-scale boom spraying using ATV or pickup-mounted equipment. Smaller scale infestations occur within all plant communities in the District. The second treatment scale is the invasive annual grasses, generally Categories 4 and 5, which can be thousands of acres in extent. Of these grasses, medusahead rye is the most serious problem on the Burns District. Most infestations retain a component of desirable native vegetation. Within these large invasive annual grass infestations, three approaches are practical and may be combined: large-scale herbicide treatments including aerial spraying; targeted grazing; and, treatments where invasive annual grasses are prominent that break up the landscapes and reduce the likelihood of sweeping unchecked wildfires. The goal of invasive plant treatments is to tip or maintain the successional trajectory toward late seral native plant communities. Sheep and goats readily eat many of the more problematic perennial and biennial invasive plants. There are currently no infestations on the District large-scale enough that would benefit from targeted grazing by sheep or goats, though the District is participating with private landowners in the use of goats to manage Russian knapweed. Cattle prefer grass and can be managed to

preferentially eat the invasive annual grasses. Currently the District is using cattle for targeted grazing of medusahead rye and cheatgrass on approximately 14,000 acres.

No Action Alternative

Only noxious weeds would be treated with herbicides. Manual and biological controls (including targeted grazing) would continue to be used to control noxious weeds and other invasive plants on about 14,000 acres per year (see Table 3-1, *Estimated Treatment Acres*). According to herbicide application estimates in Table 3-1, 2,4-D would be the most-used herbicide, because it is usually tank mixed with the other authorized herbicides, followed by dicamba, glyphosate, and picloram. Picloram, dicamba, and 2,4-D are selective for broad-leaved plants. Glyphosate is not selective. These treatments would occur in all plant communities across the District.

Medusahead rye would be treated with imazapic within limited areas in the District (see Table 2-7, *Summary of NEPA Covering the No Action Alternative*). The herbicides chlorsulfuron and clopyralid would also be used on other invasive plants in some of those project areas. Occasionally, the non-selective herbicide glyphosate (available District-wide) may be used on medusahead rye if the intermixed non-target vegetation is relatively resistant or not present. Such treatments are relatively uncommon, because the treatment window is small and most sites with medusahead rye have intermixed desirable vegetation. In all, about 26,000 acres in 6,857 invasive plant sites in Category 1 plus 170,000 acres of medusahead rye in Category 5 would be treated over the next 10 to 15 years. Small acreages would be treated in Category 2 and Category 3. Except for medusahead rye treatments in limited areas, most other herbicide applications would continue as spot spraying or small scale ground treatments. Since the No Action Alternative herbicides are about 60 percent effective, many of these sites would be treated repeatedly.

Proposed Action

Noxious weeds and other invasive plants would be treated wherever they occur, and with all of the tools available under this alternative including 14 herbicides (see Table 2-9, *Herbicide Information*). Manual and biological controls (including targeted grazing) would occur the same as under the No Action Alternative (see Table 3-1, *Estimated Treatment Acres*). The 26,000 acres of known sites in Category 1, plus Category 2 and 3 invasive plants would be treated with herbicides over the next 10 to 15 years. Use of the four No Action Alternative herbicides would decrease because the ten additional herbicides are more selective, effective, and require lower application rates.

In addition to Categories 1-3 sites, an estimated 300,000 acres of existing medusahead rye plus other invasive annual grasses (cheatgrass and North Africa grass - Category 5) would be treated with imazapic and other herbicides that are selective for them. Up to 100,000 acres of these invasive annual grasses could be treated in Category 5 annually, mostly with imazapic. Most of this area would be in Wyoming big sagebrush and warmer and dryer mountain big sagebrush plant communities with a goal of reducing the ecological impacts of invasive annual grasses while the native vegetation can still recover.

Annual Category 4 treatment acres are unpredictable because they depend on the acres burned, the size and pre-fire condition of the burned area, and amount of emergency stabilization and rehabilitation funding received. Once an emergency stabilization and rehabilitation proposal is approved and funded, second and third year herbicide treatments are more predictable, because they are based on the plan and amount funded. Emergency stabilization funding is limited to one year, and rehabilitation funding can last up to three years. Subsequent treatments must be paid for from other funding sources. Table 2-4, *Summary of Recent Wildfire (1992-2014)*, shows the variability in fire size that is possible from year to year.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse effects to native and other desirable vegetation would be minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include, but are not limited to:

- Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation.
- Select the herbicide that is least damaging to the environment while providing the desired results.
- Apply the least amount of herbicide needed to achieve the desired result.
- Avoid accidental direct spray and spill conditions to minimize risks to resources.
- 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 reduction agents, as appropriate, to reduce the drift hazard to non-target species.
- Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- Limit the aerial application of chlorsulfuron and metsulfuron methyl to areas with difficult land access, where no other means of application are possible.

Environmental Consequences

Adverse Effects of Treatment Methods on Native Vegetation

Non-Herbicide Treatments

The acres to be treated with these methods would be comparable under both alternatives (see Table 3-1, *Estimated Treatment Acres*), so potential effects of these treatments on native vegetation would be the same under both alternatives. Seeding and prescribed fire for invasive annual grasses would require further analysis before implementation, so those treatments are not considered here.

Manual treatments are small in scale, selective, and may create an opening in the plant community. Nearby natives can be trampled or uprooted. The disturbed ground can be readily reinvaded if invasive plant seed is present, negating the gain for nearby native plants.

Mechanical treatments use equipment to cut the target plants below the flowers, near ground level, or uproot the plant. Unless the target infestation is monotypic, the intermixed desirable vegetation receives the same treatment. Mowing can cover hundreds of acres and be effective against annual species where prevention of seed production for several consecutive years can eliminate the infestation, but interspersed native shrubs can be set back as well.

Targeted grazing can tip the successional balance of an infested site toward the native plants, though it will not eliminate the infestation. During targeted grazing, native plants could be trampled or eaten by livestock; however, Standard Operating Procedures would limit damage to native vegetation. For example, targeted grazing would be used in the fall when livestock can be managed to select the invasive annual grasses, while the perennial bunchgrasses are dormant and less palatable.

Classical Biological controls can tip the successional balance of an infested site toward the native plants. Those available for release feed only on the target host and do not attack native vegetation. They benefit native and other desirable plants by reducing the abundance and reproductive capacity of host invasive plants, ideally

reducing vigor, abundance, and density within a plant community. The use of biological controls is not expected to differ between the alternatives.

Prescribed fire would be used only on invasive plants in Categories 1 and 2, and only occasionally (once or twice a decade). Prescribed fire would be used in areas that have become so infested with invasive plants that the site has been lost to native vegetation.

Herbicide Treatments

The goal of BLM's use of herbicides on invasive plants is to damage or eliminate the target plants while minimizing harm to nearby or intermixed non-target vegetation. One way to accomplish this is by using selective herbicides. For example, treatment of disturbed sites with imazapic at 6 ounces per acre in early fall can prevent medusahead rye seed germination while avoiding damage to the intermixed non-target perennial native vegetation. Similarly, invasive broadleaf plants can be removed with 2,4-D while avoiding damage to interspersed native grasses.

Another way to minimize harm to nearby non-target vegetation is to minimize herbicide drift. Wind, high temperatures, high-pressure spray, small droplet size, and aerial application increase drift. Wicking and similar methods where the herbicide is wiped onto the target plant eliminate the risk of drift. Wicking, like many ground-based herbicide applications, is slow, labor intensive, has the potential to trample native vegetation, and is not appropriate for certain species and large areas. However, drift control agents and controls on application methods and conditions described on labels, Standard Operating Procedures, and Mitigation Measures help minimize the risk of drift to non-target vegetation or out of the treatment site.

Most of the noxious weed species on the Burns District are broad-leaved plants, and many of the herbicides proposed for use on those plants are also selective against native forbs. Forbs are a relatively small component of the sagebrush plant communities on the District, but they are a critical component of spring big game and wildlife habitat as well as spring and summer sage-grouse habitat. Controlling the season of treatment can minimize potential impacts of herbicides on intermixed native forbs. Many of the biennial and perennial invasive plants can be sprayed post-frost and they will translocate herbicide to their roots, while the native forbs avoid the potential effects of drift because they have gone dormant. The effects of herbicides on native vegetation are listed on Table 3-11.

Table 3-11. Effects of Herbicides (Native Vegetation)

Effects of Herbicides selective for broad leaved plants	
Herbicides available under both alternatives	
2,4-D	2,4-D: is a selective herbicide that kills broadleaf plants, but not grasses. It has a long history of use and is relatively inexpensive. Direct spraying of non-target plant species is the highest potential for damage due to 2,4-D application. Drift could damage non-target species close to the application site (much less than 100 feet). 2,4-D poses a high risk at typical and maximum rates from direct spraying or drift to broadleaf forbs and shrubs, although there is no risk to grasses and other tolerant (non-susceptible) plants. Risk to susceptible plants from offsite drift from broadcast treatments is low, although drift from aerial applications was not evaluated. Risk scenarios indicate that there is no risk to susceptible plants from offsite drift associated with hand directed foliar applications or surface runoff. Plant communities would benefit from the reduction of invasive broadleaf plants from 2-4,D, which is expected to increase vigor of perennial grasses, forbs, and shrubs. 2,4-D is also used to prevent herbicide resistance when mixed with herbicides with other modes of action.
Dicamba	Dicamba is a selective, systemic herbicide that can affect some annual, biennial, or perennial broadleaf and woody species. Dicamba poses a high risk to non-target terrestrial forbs from direct spray and drift scenarios; a moderate risk to terrestrial forbs from off-site drift and no risk from surface runoff or wind erosion (although wind erosion may cause impacts in arid regions)(SERA 2004g). The greatest risks to aquatic plants are associated with runoff, but are highly site-specific. Drift may cause damage to susceptible species at distances less than 100 feet from the application site. Vaporized or volatilized dicamba can affect non-target plants. Vaporization does affect vegetation, but much more study in air concentration-duration relationships needs to be done to quantify the level of effects. Vaporization potential is dependent on atmospheric

	stability and temperature. Dicamba vapor has been known to drift for several miles following application at high temperatures (Cox 1994).
Picloram	Picloram poses substantial risks to non-target (broadleaf and woody) plants (EPA 1995). Picloram is highly soluble in water, resistant to biotic and abiotic degradation processes, and mobile under both laboratory and field conditions. The EPA Fact Sheet for picloram states that there is a high potential to leach to groundwater in coarse textured soils with low organic material. Plant damage could occur from drift, runoff, and off-site where contaminated ground water is used for irrigation or is discharged into surface water (EPA 1995). However, the contribution from irrigation is considered inconsequential relative to off-site drift and runoff (SERA 2003b). Picloram is a restricted-use herbicide and can only be purchased and applied by licensed applicators. Additional requirements on the label prevent the use of this herbicide on coarse textured soils, above fractured bedrock and within no-spray buffers surrounding waterbodies. Because picloram persists in soil, non-target plant roots can take up picloram (Tu et al. 2001), which could affect re-vegetation efforts. Additionally, animals can pass sufficient quantities of picloram in urine from treated sites in to damage susceptible non-target plants (primarily legumes, such as alfalfa) for up to one year (Lym et al. 1998). According to the Risk Assessment (Appendix C, *Herbicide Risk Assessment Summaries*), picloram poses a high risk to susceptible plants from direct spray scenarios, and a low to moderate risk for tolerant (non-susceptible) plants at typical and maximum rates respectively. Offsite drift poses a high risk to susceptible plant from ground and aerial applications. The risk from offsite drift from hand directed backpack spraying is moderate for susceptible plants. Risk from surface runoff is low at the typical rate and moderate at the maximum rate for susceptible plants, legumes in particular (SERA 2011c). Picloram would be used to control species such as Russian knapweed and musk thistle in terrestrial areas.
Herbicides available in limited areas under the No Action Alternative and District-wide under the Proposed Action	
Chlorsulfuron	Chlorsulfuron selectively controls pre-emergent and early post-emergent broadleaf plants (see Table 2-9, *Herbicide Information*). It is effective at very low dosages (half ounce to a few ounces per acre). Because of its high potency and longevity, chlorsulfuron can pose a particular risk to non-target plants. Off-site movement of even small concentrations of these herbicides can result in extensive damage to surrounding plants, and damage to non-target plants may result at concentrations lower than those reportedly required to kill target invasive plants (Fletcher et al. 1996). It poses a high risk to non-target terrestrial forbs from direct spray at typical and maximum rates, a moderate risk to non-target terrestrial forbs from offsite drift at typical and maximum rates, and no risk to terrestrial plant from runoff or wind erosion. Chlorsulfuron would be used most often to control perennial mustards that are most abundant in the Salt Desert Scrub. Forbs are not common in Salt Desert Scrub and impact to forbs is likely although those are expected to be less than the benefit of removing invasive plants.
Clopyralid	Clopyralid is selective for broadleaf plants and poses a high risk to forbs and shrubs from direct spray at typical and maximum rates. Offsite drift risk from broadcast applications to susceptible plants is low at the typical rate and moderate at the maximum rate. Drift from aerial applications of clopyralid pose a moderate risk at the typical rate and a high risk at the maximum rate. There is no risk for even susceptible plants from runoff. Clopyralid would be used to effectively control thistle and knapweed infestations. Clopyralid is more selective and less persistent than picloram. Clopyralid is relatively non-toxic to aquatic plants; however, accidental spills may result in temporary growth inhibition of aquatic plants. As with picloram, clopyralid has little effect on grasses and members of the mustard family. Overall effects to non-target plants from normal application of clopyralid are likely to be limited to susceptible plant species in or very near the treatment area.
Herbicides available under the Proposed Action	
Diflufenzopyr	Diflufenzopyr would be used only in combination with dicamba and would be used to selectively control broadleaf forbs, such as knapweeds. Diflufenzopyr + dicamba poses a high risk to terrestrial forbs at the maximum rate and a moderate risk at the typical rate. It poses no risk to forbs from offsite drift, surface runoff, or wind erosion. Diflufenzopyr + dicamba would be used mainly along roads and in disturbed areas as an alternative to dicamba. Diflufenzopyr acts by disrupting the delicate auxin balance needed for plant growth. It is selective for annual broadleaf plants and can suppress perennials. Although diflufenzopyr is a weak herbicide, it can reduce the amount of herbicide needed from 1-2 pounds per acre of dicamba alone to 0.26-0.35 pounds per acre of diflufenzopyr + dicamba. Diflufenzopyr would affect all plant communities by reducing the amount of herbicides applied to control invasive broadleaf plants, which would be expected to increase the vigor of perennial grasses and forbs.
Imazapyr	Imazapyr is non-selective, posing a high risk to susceptible plants and a low risk to tolerant (non-susceptible) plants in direct spray scenarios (SERA 2011b). Currently, projected use would be on fewer than ten acres per year (see Table 3-1, *Estimated Treatment Acres*) to control Russian olive, salt cedar, and reed canary grass,

	and it could be used as a backup choice on other invasive plants if herbicide resistance develops. Effects would be limited to the immediate application area.
Metsulfuron methyl	Metsulfuron methyl is selective for broadleaf and woody plants (see Table 2-9, *Herbicide Information*) and poses a high risk from direct spray to susceptible plants at the typical and maximum rate, and a low to moderate risk to tolerant (non-susceptible) plants at the typical and maximum rate respectively. Risk from offsite drift from broadcast spraying is low to moderate for susceptible plants from ground applications and moderate to high for aerial applications for typical and maximum rates respectively. Metsulfuron methyl would be used under the Proposed Action to manage Mediterranean sage and perennial mustards, especially on roadsides.
Triclopyr	Triclopyr is a selective systemic herbicide used on broadleaf and woody species. Susceptible species could be impacted by drift from 100 feet (typical rate) to 1,000 feet (maximum rate) (SERA 2003c). Two forms of triclopyr could be used with differing degrees of effects. Triclopyr BEE (butoxyethyl ester) is more toxic to plants than triclopyr TEA (triethylamine salt). The triclopyr BEE form is more apt to damage plants from runoff than other forms (SERA 2003c). Direct spray scenarios indicate a high risk for susceptible plants and a low risk for tolerant (non-susceptible) plants at the maximum rate. Risk from offsite drift is low to moderate for susceptible plants at the typical and maximum rates respectively (SERA 2011d). Either formulation may be proposed for use on woody species in an upland environment but may be used in wetlands and riparian areas that go dry for part of the year. It would be used primarily to treat purple loosestrife, tamarisk, and Russian olive. Only the aquatic form may be used over water.
Herbicides that can be selective for invasive annual grasses	
Herbicides available in limited areas under the No Action Alternative and District-wide under the Proposed Action	
Imazapic	Imazapic would be primarily used to control pre-emergent 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, Miller 2006, Davison and Smith 2007). Imazapic used at low rates (typically 6 oz. per acre) would reduce invasive annual grass cover and fire risk in the Sagebrush Steppe and the Forest and Woodland communities.
Sulfometuron methyl	Sulfometuron methyl is non-selective and is not available for use on rangelands. It is registered for use on rights-of-ways, forests and woodlands, and recreation sites. There would be low risk to sagebrush steppe plants at maximum application rates on those sites. Sulfometuron methyl would not be applied in winds, as drift could cause extensive damage to vegetation at a substantial distance from the application site. Sulfometuron methyl would be used in terrestrial settings to control dense stands of invasive annual grass species. During applications of sulfometuron methyl, a drift prevention agent would be used, and the current registration does not permit it to be applied through aerial application.
Herbicides available under the Proposed Action	
Hexazinone	Hexazinone controls grasses and broadleaf and woody plants, both pre- and post- emergent. Risks to plants were not evaluated for direct spray, surface runoff, or erosion scenarios; however, risk from offsite drift is low for susceptible plants, with no risk to tolerant (non-susceptible) plants. Hexazinone has differential toxicity to plants and is effective against woody species. It is primarily absorbed through the roots of the plant. Impacts from hexazinone are limited as the estimate of proposed use is about 20 acres per year and Mitigation Measures limit where it can be applied.
Non-selective Herbicides	
Herbicides available under both alternatives	
Glyphosate	Glyphosate is a non-selective, systemic herbicide that can damage all groups or families of non-target plants to varying degrees, most commonly from off-site drift. Plants highly susceptible to glyphosate can be damaged by drift up to 100 feet from the application site if applied at the maximum rate. Species that are more tolerant are likely to be damaged at distances up to 25 feet (SERA 2003a). Non-target species are not likely to be affected by runoff or absorption from soil or wind erosion. Glyphosate strongly adsorbs to soil

	particles, which prevents it from being taken up from the soil by plant roots (Tu et al. 2001, SERA 2003a). Field studies conducted using glyphosate found no effects to plant diversity in an 11-year study on site preparation using herbicides, though the structural composition and perennial species' presence were changed (Miller et al. 1999). Glyphosate poses a high risk to grasses, forbs, shrubs, and trees from direct spray scenarios at typical and maximum rates. Some plants are tolerant of glyphosate, and these are at low to moderate risk from direct spray at typical and maximum rates respectively. The risk from offsite drift for susceptible plants is high for aerial applications, moderate for low boom and low to moderate for hand directed foliar applications (SERA 2011a). Glyphosate is the only herbicide effective on grasses in the No Action Alternative. However, because it is non-selective, it would only be used in spot treatments or where monocultures of invasive plants are present (see *Treatments Planned Relating to the Issues* section above).
Herbicides available under the Proposed Action	
Fluridone	Fluridone is a non-selective, slow-acting herbicide that could be used in low concentrations to control submerged and emergent invasive plants in ponds or reservoirs, lakes and canals where long-term contact with the target plants can be maintained (not flowing waters). When used on aquatic invasive plants, any native plants present would be controlled as well. Terrestrial plants would not be treated with fluridone: hence, none of the described plant communities would be affected. (There are currently no known aquatic invasive plants on the Burns District.)

Adverse Effects of Invasive Plants on Native Vegetation

The International Union for the Conservation of Nature ranks invasive species as one of the top ten threats to currently threatened species (IUCN 2008). In general, invasive plants can change the characteristics and successional trajectory of native plant communities, and can often lead to near monocultures of the invasive plant. Many invasive plants modify invaded sites so that the site becomes inhospitable to the original plant community. For example, knapweeds and starthistles are known to increase sheet erosion and produce chemicals that prevent other species from germinating (Boersma et al. 2006).

Of particular concern are the invasive annual grasses, particularly medusahead rye. Invasive annual grasses are a threat to all the Wyoming big sagebrush and lower elevation and drier mountain big sagebrush plant communities on the District. The impacts of these grasses tend to decrease as elevation and soil moisture increase. The change from a sagebrush steppe to a medusahead rye community is completely site specific and linked to weather and the type and severity of disturbance (not just fire). Initial invasion usually happens during multi-year drought. The medusahead rye can remain an inconspicuous component of the understory for many years, increasing a little during each multi-year drought. Eventually a wildfire will kill the sagebrush and open the site to invasion. The most successful invader will be medusahead rye. Fire favors invasive annual grasses by releasing nutrients and removing overstory plants. The perennial bunchgrasses will also increase in landscape cover and production for the same reasons. The more annual grasses in the community, the better that community is able to carry fire, because they fill in the spaces between the perennial bunchgrasses. Sagebrush steppe with a lot of medusahead rye tends to have larger fires. After repeated fires with only a few years in between, the perennial bunchgrasses cannot compete and drop out of the community. The result is a medusahead rye plant community with few native plants and few perennial plants.

Native ecosystems adjacent to BLM-administered lands are degraded when invasive plants spread from BLM-administered lands (USDI 2010a:149). Adjacent landowners control these plants with more effective herbicides than BLM currently uses (except for the areas included in Table 2-7, *Summary of NEPA Covering the No Action Alternative*). This situation is frustrating to adjacent landowners, because of the added effort and cost to treat invasive plants originating on BLM-administered lands.

Adverse Effects by Alternative

No Action Alternative

As shown on Table 3-4, *Summary of Invasive Plants by Infestation Size*, most of the documented noxious weed sites (Category 1) are small. Because native vegetation is intermixed or nearby, damage from trampling, cutting, drift or other contact with herbicides is possible. Avoiding collateral damage can be most difficult with picloram because it is mobile in wet soils and can remain effective for up to a year. If applied in the fall, picloram can move with spring rain or runoff and damage nearby native plants as they start spring growth. Since it is difficult to avoid overspray or drift, collateral damage to adjacent native plants is more likely with the No Action Alternative because there are fewer selective herbicides from which to choose when compared to the Proposed Action. Because of the concerns for such damage, some sites are not treated under this alternative.

Although picloram or picloram + 2,4-D are used to treat Russian knapweed and Canada thistle, these herbicides rarely eliminate either species. As described above, this can result in an area where the only broadleaved plants are noxious weeds. The treatment area cannot recover native broadleaved plants (shrubs and forbs) while this treatment regime is occurring. This can be especially problematic in riparian areas when the noxious weeds occupy sites that require densely rooted sedges and rushes for bank stability or willows and other shrubs / trees for stream cover and shading.

Except for the treatments on Table 2-7, *Summary of NEPA Covering the No Action Alternative* where imazapic use is authorized, most of the adverse effects of medusahead rye and all of the adverse effects of cheatgrass described above would apply to this alternative. Only glyphosate is effective on medusahead rye and it kills all the intermixed desirable vegetation. Under this alternative, lower and dryer Wyoming big sagebrush plant communities will continue to be invaded by medusahead rye and cheatgrass, resulting in sagebrush loss due to fire, frustrating rehabilitation, and leading toward an invasive annual grass fire cycle plant community.

Proposed Action

Most of the herbicides added by this alternative would be effective at much lower doses than those under the No Action Alternative. As a result, drift and other misapplications would be typically more detrimental to native species in the target plant group. Also, while selectivity in the three selective herbicides in the No Action Alternative is due to the metabolic pathways targeted, selectivity in many of the additional herbicides is partially due to application rate. Thus, any combination of inaccurate equipment, adverse weather, or inconsistent application technique that affect site-specific application rates can lead to unexpected adverse effects to desirable species.

Beneficial Effects by Alternative

Common to Both Alternatives

Aggressive invasive plant treatments coupled with an active prevention program has kept most of the noxious weed sites on the District small (see Table 3-4, *Summary of Invasive Plants by Infestation Size*). The invasive annual grasses are the exception. Treatment methods selective to these grasses were not available to the Burns District until 2010.

Proposed Action

Use of the four herbicides would decrease (although 2,4-D only slightly)(see Table 3-1, *Estimated Treatment Acres*). The average amount of herbicide applied per acre of treatment would decrease, but because most of the additional herbicides are simply designed for use at lower rates, this alone is not necessarily meaningful. However,

the number of times a site would be treated would also decrease because the additional herbicides would improve overall treatment effectiveness (USDI 2010a:136-137, 594-597). This would reduce potential exposure for adjacent native plants. Also with retreatments, there would be an opportunity to use a different herbicide, again potentially reducing exposure for non-target plants. Finally, simply having more choices of treatment methods would make it more likely that a method less hazardous to surrounding desirable resources can be used. This alternative also includes herbicides that would selectively and reliably kill Russian knapweed and Canada thistle, ending the need to retreat the same infestations annually. This would decrease long-term herbicide use on these sites; reducing exposure to adjacent native plants and to nearby surface and ground waters as well.

On a landscape scale, the Proposed Action would enable the selective treatment of medusahead rye and cheatgrass in sagebrush steppe and other native plant communities while native species are still common and can recover to a functional native plant community. Sagebrush plant communities need long periods between fires to recover. Where annual grasses have infested and burn more frequently, treating the burned area in the following fall with imazapic would give the residual perennial plants time to recover and spread before the medusahead rye or cheatgrass re-establishes. If those years are favorable to perennial plant spread, desirable species may be able to reoccupy niches and replace the invasive plants. Herbicides selective against medusahead rye and cheatgrass, such as imazapic, would also be used to break up large areas of homogeneous invasive annual grass fuels to help achieve longer fire cycles.

The proposed herbicides would make cooperative treatments with neighboring landowners more practical, because those landowners typically already use the proposed herbicides. BLM would demonstrate more effective control of invasive plants on public land and encourage more effective invasive plant control across ownerships, better protecting native plants and potentially reducing overall herbicide use (USDI 2010a:118).

Cumulative Effects

Many vegetation management projects have the potential to both advance succession and create disturbances. Table 3-3, *Foreseeable Actions Potentially Relating to Cumulative Effects* lists the current and planned projects for the District. Planned and ongoing projects that directly affect native vegetation include habitat restoration, livestock grazing, fuel break mowing, and mining, while other activities tangentially affect vegetation.

Many of the District habitat restoration projects are juniper control in sagebrush plant communities. Current and planned juniper treatments on 256,645 acres include cutting, burning, or both. Cutting reduces soil moisture use by juniper making it available for other plants. Burning removes existing aboveground biomass in the burned area and stimulates seed germination and regrowth of perennial plants. Juniper treatments are designed to improve rangeland health in sagebrush steppe, forests, mountain shrub stands, and riparian areas; these treatments can cause short-term negative impacts to vegetation but would have long-term benefits as the plant community moves towards native late seral stages. The juniper is disposed of by broadcast burning, pile burning, scattered and left to decompose, or picked up for firewood. Broadcast burns are inspected for invasive plants; if found, they would be treated. Burn piles are inventoried, treated, and / or seeded. Because of the relationships among invasive annual grasses, fire frequency, and fire size, most emergency stabilization and rehabilitation projects have an invasive plant control component.

Livestock grazing has occurred on the District for decades and has resulted in changes in plant communities, especially in the sagebrush steppe and riparian areas. Today most of the District is open to grazing except for 97,229 acres of the Steens, Diamond Craters Outstanding Natural Area, and over 5,000 acres of various exclosures including several ACECs and RNAs. Grazing has a direct effect on herbaceous plants through selective cropping of palatable plants, some trampling, deposition of urine and feces, soil compaction, and loss of biological soil crusts. On the other hand, targeted grazing can be managed to support native vegetation diversity by reducing woody shrub cover and encouraging native forbs and bunchgrasses (see *Invasive Plant* section).

Fuel break mowing on 1,305 acres in sagebrush steppe was designed to reduce fire size and increase the time between fires. The Proposed Action would make existing fuel breaks more effective by allowing treatment of cheatgrass.

Managing vegetation is an integral part of BLM land management in the District. BLM's regulatory direction is to achieve rangeland health (43 CFR 4180.1). In the past, present, and reasonably foreseeable future, there have been and would continue to be uses, projects, and activities within the District that are designed to restore, maintain, or enhance native plant communities as part of achieving rangeland health. The net effect of all these actions would lead to a net improvement in native vegetation over time.

Special Status Plants

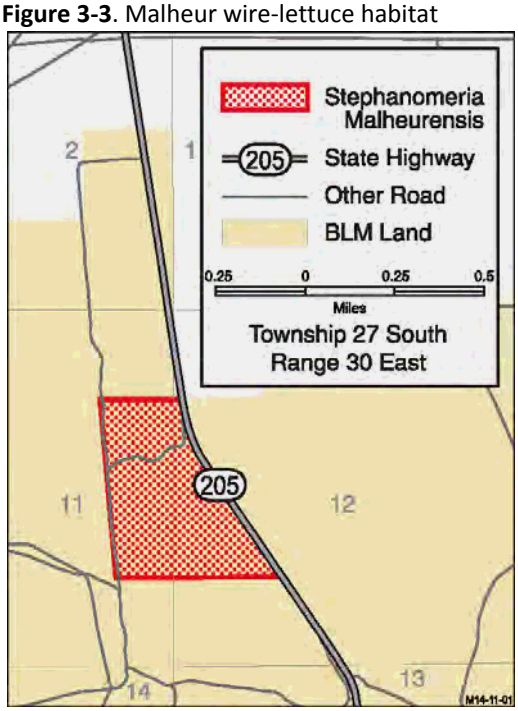
Issues

- How would the alternatives affect Special Status plants?

Affected Environment

Species designated as Special Status by the BLM include 1) those federally listed or proposed for listing as endangered or threatened under the *Endangered Species Act*, and 2) species designated by the BLM State Director as Bureau Sensitive and requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the *Endangered Species Act*. These are managed under provisions of the BLM's Special Status Species Program (USDI 2008c). BLM management activities must be conducted to minimize or eliminate threats affecting the status of these species or to improve the condition of the species' habitat by ensuring that management activities are carried out in a way that does not lead to a need to list the species under the *Endangered Species Act*. Potentially habitat-disturbing projects require pre-project clearances for Special Status plants. Clearances can include proposed project review for potential habitat and / or project site surveys.

Figure 3-3. Malheur wire-lettuce habitat



The Special Status plant species located within the boundaries of the Burns District occur on various soil types, in different precipitation zones and at various elevations. In areas below 8 inches of annual precipitation, conditions are such that invasive weeds, including invasive annual grasses, are not a dominant part of the vegetative community. There are infestations along roadsides and near water sources; however, these areas are less than 1% of the total community. Additionally, in areas where precipitation is above 12 inches annually, and generally over 5,000 feet in elevation, the vegetative communities have a higher resistance to invasion and are more resilient in their recovery. Like in the low precipitation ranges, most invasive weed species occur in and around travel corridors. Those species located within the 8 to 12 inch precipitation zone and below 5,000 feet in elevation, regardless of soil type, are most at risk to invasion from invasive weed species, specifically invasive annual grasses. These Special Status species would be the most at risk from weed treatments, but would also benefit the most from the reduced competition from invasive weed species.

The only federally listed species on the District, Malheur wire-lettuce, has been documented on 9.5 acres of land and is located within the South Narrows ACEC and within the inch precipitation zone. The ACEC is a no-graze area and per the Recovery Plan, intensive active management of the area is prohibited. As a result, the designated critical habitat is dominated by an understory of cheatgrass. In 2013, a total of 9 plants were documented on the site with no plants documented in 2014; however, the area has been in a drought since 2011 which may be affecting the growth and development of this species.

The Final Oregon / Washington State Director Special Status Species List, December 1, 2011 lists 39 documented and 28 suspected Special Status plant species located on the District. Burns District personnel have mapped approximately 10,128 acres of documented Special Status plant populations throughout the District. One of the Special Status plant species that is documented on approximately 9.5 acres on the District is federally listed under the *Endangered Species Act* as endangered, *Stephanomaria malheurensis* (Malheur wire-lettuce. See Figure 3-3). A complete list of the Special Status plant species documented or suspected on the District is provided in Table 3-12.

Table 3-12. Special Status Plants

Group	Family	Growth Habit	Scientific Name	Common Name	Geo Area[1]	Suspected / Documented	Acres
Dicot	Nyctaginaceae	Forb / herb	*Abronia turbinata*	trans montane abronia	AN	Documented	9.18
Monocot	Poaceae	Graminoid	*Achnatherum speciosum (Pappostipa speciosa)*	desert needlegrass	AN, ST	Documented	114.8
Dicot	Lamiaceae	Forb / herb Subshrub	*Agastache cusickii*	Cusick's hyssop	AN, ST	Documented	34.27
Dicot	Chenopodiaceae	Shrub Subshrub	*Allenrolfea occidentalis*	iodine bush	AN	Documented	262.4
Dicot	Papaveraceae	Forb / herb	*Argemone munita s. rotundata*	prickly poppy	AN, ST	Documented	314.4
Dicot	Fabaceae	Forb / herb Subshrub	*Astragalus tegetarioides*	Deschutes milkvetch	3R	Documented	901.12
Fern	Ophioglossaceae	Forb / herb	*Botrychium crenulatum*	crenulate grapefern	ST	Documented	1.07
Fern	Ophioglossaceae	Forb / herb	*Botrychium lunaria*	moonwort	ST	Documented	7.14
Monocot	Cyperaceae	Graminoid	*Carex capillaris*	capillary sedge	3R	Documented	1.26
Monocot	Cyperaceae	Graminoid	*Carex capitata*	capitate sedge	ST	Documented	0.63
Monocot	Cyperaceae	Graminoid	*Carex cordillerana*	cordilleran sedge	ST, 3R	Documented	10.84
Monocot	Cyperaceae	Graminoid	*Carex subnigricans*	dark alpine sedge	ST	Documented	1.43
Monocot	Cyperaceae	Graminoid	*Carex tiogana*	Tioga pass sedge	ST	Documented	1.26
Monocot	Cyperaceae	Graminoid	*Carex vernacula*	native sedge	ST	Documented	4.51
Dicot	Asteraceae	Forb / herb	*Chaenactis xantiana*	desert pincushion	AN	Documented	93.99
Dicot	Asteraceae	Forb / herb	*Chaetadelpha wheeleri*	Wheeler's skeletonweed	AN	Documented	74.13
Dicot	Apiaceae	Forb / herb	*Cymopterus nivalis*	snowline cymopterus	ST	Documented	54.58
Dicot	Apiaceae	Forb / herb	*Cymopterus purpurascens*	purple cymopterus	AN	Documented	17.32
Dicot	Polygonaceae	Forb / herb	*Eriogonum brachyanthum*	short-flowered eriogonum	AN	Documented	3.79
Dicot	Polygonaceae	Forb / herb	*Eriogonum cusickii*	Cusick's eriogonum	3R	Documented	106.11
Dicot	Gentianaceae	Forb / herb	*Gentiana prostrata*	moss gentian	ST	Documented	10.83
Dicot	Gentianaceae	Forb / herb	*Gentianella tenella s. tenella (Comastoma tenellum)*	slender gentian	ST	Documented	1.93
Dicot	Boraginaceae	Forb / herb Subshrub	*Heliotropium curassavicum*	salt heliotrope	AN, 3R	Documented	98.08
Dicot	Brassicaceae	Forb / herb	*Lepidium davisii*	Davis' peppergrass	AN	Documented	45.43
Dicot	Asteraceae	Forb / herb	*Malacothrix sonchoides*	lyrate malacothrix	AN	Documented	192.54
Dicot	Hydrophyllaceae	Forb / herb	*Phacelia inundata*	playa phacelia	3R	Documented	16.34

Group	Family	Growth Habit	Scientific Name	Common Name	Geo Area[1]	Suspected / Documented	Acres
Monocot	Potamogetonaceae	Forb / herb	*Potamogeton diversifolius*	Rafinesque's pondweed	ST	Documented	22.37
Dicot	Brassicaceae	Forb / herb	*Rorippa columbiae*	Columbia cress	3R	Documented	90.05
Dicot	Saxifragaceae	Forb / herb	*Saxifraga adscendens s. oregonensis*	wedge-leaf saxifrage	ST	Documented	8.23
Dicot	Aizoaceae	Forb / herb	*Sesuvium verrucosum*	verrucose sea-purslane	AN	Documented	26.84
Dicot	Brassicaceae	Forb / herb	*Stanleya confertiflora*	biennial stanleya	3R	Documented	391.47
Dicot	Asteraceae	Forb / herb	*Stephanomeria malheurensis*	Malheur wire-lettuce	3R	Documented	9.51
Dicot	Caprifoliaceae	Shrub	*Symphoricarpos longiflorus*	long-flowered snowberry	AN, ST, 3R	Documented	41.2
Dicot	Fabaceae	Forb / herb	*Trifolium leibergii*	Leiberg's clover	3R	Documented	404.57
Liverwort	Antheliaceae	Nonvascular	*Anthelia julacea*	Liverwort	?	Suspected	NA
Dicot	Asteraceae	Shrub	*Artemisia arbuscula s. longicaulis*	Lahontan sagebrush	AN, ST, 3R	Suspected	NA
Dicot	Fabaceae	Forb / herb	*Astragalus cusickii* var. *sterilis*	Sterile milk-vetch	?	Suspected	NA
Dicot	Fabaceae	Forb / herb Subshrub	*Astragalus platytropis*	broad-keeled milkvetch	?	Suspected	NA
Monocot	Liliaceae	Forb / herb	*Calochortus longebarbatus v. peckii*	Peck's mariposa lily	3R	Suspected	NA
Dicot	Onagraceae	Forb / herb	*Camissonia pygmaea*	dwarf evening primrose	ST	Suspected	NA
Monocot	Cyperaceae	Graminoid	*Carex abrupta*	abrupt-beaked sedge	ST	Suspected	NA
Monocot	Cyperaceae	Graminoid	*Carex atrosquama*	blackened sedge	?	Suspected	NA
Monocot	Cyperaceae	Graminoid	*Carex pelocarpa*	a sedge	ST	Suspected	NA
Monocot	Cyperaceae	Graminoid	*Carex scirpoidea v. stenochlaena*	Alaskan single-spiked sedge	ST	Suspected	NA
Dicot	Brassicaceae	Forb / herb	*Caulanthus major v. nevadensis*	slender wild cabbage	?	Suspected	NA
Dicot	Polemoniaceae	Forb / herb	*Collomia renacta*	Barren Valley collomia	AN	Suspected	NA
Dicot	Apiaceae	Forb / herb	*Cymopterus ibapensis*	Ibapah wavewing	?	Suspected	NA
Monocot	Cyperaceae	Graminoid	*Eleocharis bolanderi*	Bolander's spikerush	?	Suspected	NA
Dicot	Onagraceae	Forb / herb	*Eremothera pygmaea (Camissonia pygmaea)*	Dwarf evening-primrose	?	Suspected	NA
Dicot	Asteraceae	Forb / herb	*Erigeron latus*	Broad fleabane	?	Suspected	NA
Dicot	Polygonaceae	Forb / herb	*Eriogonum prociduum*	prostrate buckwheat	?	Suspected	NA
Dicot	Polygonaceae	Forb / herb	*Eriogonum salicornioides*	playa buckwheat	?	Suspected	NA
Dicot	Scrophulariaceae	Forb / herb	*Gratiola heterosepala*	Boggs Lake hedge-hyssop	?	Suspected	NA
Dicot	Rosaceae	Forb / herb	*Ivesia rhypara v. rhypara*	grimy ivesia	AN	Suspected	NA
Dicot	Rosaceae	Forb / herb	*Ivesia rhypara v. shellyi*	Shelly's ivesia	AN	Suspected	NA
Monocot	Juncaceae	Graminoid	*Juncus tiehmii*	Tiehm's rush	?	Suspected	NA
Liverwort	Jungermanniaceae	Nonvascular	*Jungermannia polaris*	Liverwort	?	Suspected	NA
Dicot	Apiaceae	Forb / herb	*Lomatium roseanum*	Rose's lomatium	AN	Suspected	NA
Liverwort	Jungermanniaceae	Nonvascular	*Lophozia gillmanii*	Liverwort	?	Suspected	NA
Dicot	Fabaceae	Forb / herb	*Lupinus nevadensis*	Nevada lupine	?	Suspected	NA
Dicot	Loasaceae	Forb / herb	*Mentzelia congesta*	United blazingstar	?	Suspected	NA
Dicot	Scrophulariaceae	Forb / herb	*Mimulus evanescens*	disappearing monkeyflower	ST	Suspected	NA
Liverwort	Marchantiaceae	Nonvascular	*Preissia quadrata*	Liverwort	?	Suspected	NA
Dicot	Lythraceae	Forb / herb	*Rotala ramosior*	toothcup	3R	Suspected	NA
Moss	Grimmiaceae	Nonvascular	*Schistidium cinclidodonteum*	Moss	?	Suspected	NA

Group	Family	Growth Habit	Scientific Name	Common Name	Geo Area[1]	Suspected / Documented	Acres
Dicot	Asteraceae	Forb / herb	*Senecio ertterae*	Ertter's senecio	?	Suspected	NA
Lichen	Caliciaceae	Lichenous	*Texosporium santi-jacobi*	Lichen	?	Suspected	NA

1. Geographic Area: 3R = Three Rivers Resource Area, AN = Andrews Resource Area, ST = Steens Mountain CMPA

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide-related effects on Special Status plants is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include but are not limited to:

- Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- 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., susceptible life stages) for Special Status species in area to be treated.
- Survey for Special Status species of concern if [targeted grazing] could impact these species[53].
- 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 A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*).

For the last bullet, the exact conservation measures adopted would depend on the method of treatment, the Special Status plant species, and the environmental conditions of the site. These decisions would be made during preparation of the Annual Treatment Plan (see Chapter 2, *Planning / Annual Treatment Plans* for more information).

Environmental Consequences

Effects of Treatment Methods to Special Status Plants

Non-Herbicide Treatments

Common to Both Alternatives

Control of invasive plants using manual, mechanical, or chemical methods could directly affect Sensitive plants. Direct negative effects could include mortality of individuals, reduced vigor due to trampling or removal of above ground parts, and reduced seed production. These effects would be minor with manual control and mechanical control using weed whackers. However, there would be less ability to target individual plants with mowing, resulting in more effects to Special Status plants in the treated area. Therefore, mowing is not normally used as a treatment method within Special Status plant populations.

Biological control agents are rigorously tested for host specificity and approved by APHIS and the State Department of Agriculture prior to release in the United States. Agents demonstrated to have direct negative

[53] Results would be entered into BLM's Oregon / Washington GeoBOB (Geographic Biotic Observations) database.

impacts on Sensitive organisms are not released. There is a slight risk that an approved agent could attack a closely related Sensitive plant species. However, no close relationships have been identified between the target Invasive plants and the Special Status plants of the Resource Area.

The application of prescribed fire has the potential to harm Special Status plant populations that are not ecologically adapted to fire. Identification of populations during required pre-project clearances surveys would trigger actions to mitigate or minimize such effects.

Targeted grazing could affect Special Status plants through herbivory or trampling of individual plants. A Standard Operating Procedure requiring surveys for Special Status species if targeted grazing could affect these species, coupled with site-specific project design considerations made part of the Annual Treatment Plan would usually preclude use of this method within Special Status populations.

By following the Standard Operating Procedures and Mitigating Measures, non-herbicide treatments are unlikely to trend any sensitive plant to Federal Listing, nor trend the Federally listed *Stephanomaria malheurensis* towards extinction.

Herbicide Treatments

Common to Both Alternatives

Special Status species are at risk from herbicides because their populations may be limited in geographic scope, and thus damage to individuals may have population implications. Pre-project clearances and protection of occupied or assumed occupied habitats as required by Special Status Species Program direction should prevent most or all adverse effects. The vast majority of treatments can be designed to reduce or eliminate adverse effects to these species; however, adverse effects could occur under any alternative for some treatment methods on some individuals. Some projects would have short-term adverse effects to individual plants in order to gain long-term benefits for the species. For example, habitat improvement projects or the reduction of competition from invasive plants may injure individual plants. In most cases, effects to individuals would be mitigated by Standard Operating Procedures, Mitigation Measures, and Conservation Measures from the PEIS Biological Assessment (e.g., no-herbicide buffers, timing of treatments, use of selective herbicides, exclosures, spot treatments that avoid Special Status plants, or avoiding or prohibiting aerial applications. See Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*). In addition, site-specific project design considerations made part of the Annual Treatment Plan would minimize risks to Sensitive plants. Design considerations include the abundance and distribution of target versus Sensitive plant species, stage of growth (phenology) of plants, and the size of the treatment area, as well as physical features like soil moisture, timing of precipitation, air temperature, wind speed, and other factors.

Some damage to individual Sensitive plants from herbicide application is probable despite cautious planning and implementation. Herbicide impacts to Sensitive plants depend on (but are not limited to) the herbicide used, its selectivity, application rate, concentration, relative toxicity to the plants in the treatment area, likelihood of exposure, timing and method of application, environmental conditions during application, and plant stage of growth. Herbicide treatments may affect individual Sensitiveplants through direct application, overspray, off-site movement, accidental trampling during ground-based application methods, and / or accidental spills. Potential impacts include mortality, reduced productivity, and abnormal growth. Risk to off-site plants from spray drift is greater under scenarios with application from greater heights (i.e., aerial application) or when air temperature or movement is high. Risk to off-site plants from surface runoff and movement through soil (leaching) is influenced by precipitation rate and timing, soil type, and application area. Measures taken to limit exposure, such as selective application methods (e.g., spot spraying, or wiping), typical application rates that are less than the maximum allowed on the label, drift reduction agents, and application restrictions based on environmental conditions (wind, precipitation, temperature, etc.) reduce the off-target movement of herbicides. Standard Operating Procedures and Mitigation Measures (Appendix A) are designed to minimize risk to non-target species including Special Status

plants. In general, plants in the sunflower (*Asteraceae*), legume (*Fabaceae*), and mustard (*Brassicaceae*) families tend to be more susceptible to broadleaf herbicides. Therefore, there may be increased risk from these herbicide treatments for Special Status plant species such as desert chaenactis (desert pincushion) of the sunflower family; Cusick's milkvetch and Leiberg's clover in the legume family; and, Columbia yellow-cress and Malheur prince's plume of the mustard family.

The only federally listed species on the District, Malheur wire-lettuce, has been documented on 9.5 acres of land and is located within the South Narrows ACEC. Surrounding infested areas would be treated with an herbicide selective for invasive annual grasses using ground equipment in the fall when wire-lettuce is dormant. If herbicide treatment of occupied sites is determined to be necessary to prevent invasive annual grasses from replacing wire-lettuce, treatments would be fall spot spraying as described above to minimize impacts to wire-lettuce. This direction is consistent with the 1991 Recovery Plan direction for herbicide use, which reads in part: "Spraying vegetation in the vicinity of *Stephanomeria malheurensis* where drift or residual effects may harm the plant should be prevented. After "safe" distances, techniques, and chemicals for spraying are determined in relation to *S. malheurensis* and its potential habitat, signs should be erected to provide a safe buffer zone. …. Spraying to control grasses without harming *S. malheurensis* may be a possible mechanism for competitor reduction. Season of application and herbicide selection should be experimentally determined" (USDI 1991a). [54]

By following the Standard Operating Procedures and Mitigating Measures, herbicide treatments are unlikely to trend any sensitive plant to Federal Listing, nor trend the Federally listed *Stephanomaria malheurensis* towards extinction.

No Action Alternative

Under this alternative, 2,4-D, dicamba, glyphosate, and picloram are available for treatment of noxious weeds. The Forest Service Risk Assessment ratings and discussions for *susceptible plants* (Appendix C, *Herbicide Risk Assessment Summaries*) are assumed to represent Special Status plants. All four herbicides present a high risk of damage to Special Status plants under direct spray scenarios. Picloram presents a high risk and the remaining three herbicides pose zero risk of damage to Special Status plants under surface run-off scenarios. 2,4-D presents low to zero risk for off-site drift scenarios depending on the method of application. Depending on the method of application, glyphosate, picloram, and dicamba present high to zero risk of damage to Special Status plants for off-site drift scenarios.

Proposed Action

In addition to the four herbicides available under the No Action Alternative, ten additional herbicides would be used for vegetation treatments under this alternative. These include triclopyr, sulfometuron methyl, metsulfuron methyl, imazapyr, imazapic, hexazinone, fluridone, diflufenzopyr + dicamba, clopyralid, and chlorsulfuron. With the exception of hexazinone, fluridone, and imazapic, these herbicides present a high risk of damage to Special Status plants through direct spray scenarios. The additional herbicides include more specific chemicals (those less likely to damage nearby Sensitive plants can more often be used), allow for a reduction in the total amount of herbicides applied (see Table 3-1, *Estimated Treatment Acres*), and include an herbicide, imazapic, that presents low to medium risk to Special Status plants under direct spray scenarios (see Table C-3 in Appendix C).

Fluridone targets aquatic plants; none of the Special Status plants on the District are aquatic, so there is unlikely to be an adverse effect on Special Status plants from this herbicide if it is used in the future.

[54] The Recovery Plan complies with ARBO II as referred to on page 60, Table 7 that reads, "if project is within 0.25 mile of a [federally] listed plant, then measures must be taken to minimize threats to NE or NLAA the species to be covered by this programmatic consultation."

Use of hexazinone is proposed for areas where invasive annual grasses have formed monocultures. Mitigation measures preclude the use of this herbicide within 300 ft. to ½ mile of Special Status plant populations.

ALS-Inhibitors: Chlorsulfuron, metsulfuron methyl, and sulfometuron methyl (sulfonylureas) and imazapic and imazapyr (imidazolinones) work by inhibiting the activity of ALS, a plant enzyme that facilitates the development of amino acids needed for plant growth. These five herbicides are effective at very low dosages (half ounce to a few ounces per acre). The ALS-inhibiting herbicides are highly active, and extremely low concentrations could injure Special Status plants. Because of their high potency and longevity, these herbicides can pose a particular risk to Sensitive plants. Off-site movement of even small concentrations of these herbicides can result in extensive damage to surrounding plants, and damage to Sensitive plants may result at concentrations lower than those reportedly required to kill target invasive plants (Fletcher et al. 1996). Chlorsulfuron may cause severe reduction in seed production of some non-target crops if they are exposed at critical stages of development (Fletcher et al. 1993). Rare or susceptible annual plants in particular may suffer if they are unable to produce seed due to exposure to chlorsulfuron. Imazapic presents low to medium risk for direct spray scenarios depending on application rate. The planned treatments utilizing imazapic that are likely to affect Special Status plants, target the invasive annual grasses. The benefits, such as reduced competition and reduction in the occupancy of native species habitat, of reducing invasive annual grasses within Special Status populations are expected to exceed any negative impacts to perennial Special Status plant populations. Existing Mitigation Measures (see Appendix A) including those requiring buffers and doing treatments when Sensitive plants are dormant would reduce the likelihood of adverse effects to Special Status plants and populations.

Synthetic Auxins: Clopyralid has little effect on grasses and members of the mustard family. Overall effects to Sensitive plants from normal application of clopyralid are likely to be limited to susceptible plant species in or very near the treatment area. These chemicals would be useful for managing invasive plants within or nearby the populations of Columbia yellowcress (in the mustard family).

The Risk Assessments show that triclopyr presents a high to low risk of damage to Special Status plants through offsite drift depending upon the application method. Mitigation measures include restricting its use within up to ½ mile of Special Status plant populations depending on formulation and method of application.

Based on Project Design Features and Mitigating measures, along with following label directions, the use of herbicides would unlikely trend any Special Status species, nor the Federally protected Malheur wire-lettuce, towards listing or total extinction.

Effects of Invasive Plants on Special Status Plants

Common to Both Alternatives

Researchers have ranked invasion from alien species as the second largest threat to endangered species in the United States (Wilcove et al. 1998). Rare species generally display narrow ecological amplitudes, keeping them geographically restricted and unable to compete over a wide range of site conditions. Although effects vary depending on species, invasive plants have the potential to disrupt plant communities through modification of nutrient cycles and disturbance regimes, resource competition, changes in habitat structure and effects on regeneration of native plants (Gordon 1998). Although the protection of sites occupied by Special Status species is a priority for BLM invasive plant control efforts, success of those efforts would vary depending upon the likelihood of those sites being invaded and whether effective invasive plant control tools are available.

No Action Alternative

Under current management, the rate of spread is estimated at 12 percent from existing documented noxious weed sites (see *Invasive Plants* section earlier in this Chapter). This spread would continue to encroach on Special Status plant populations that have previously been unaffected by invasive plant infestations.

Areas infested with invasive annual grasses are generally not being controlled due to the lack of selective treatment methods available. Currently, 391 acres of Malheur prince's plume are moderately to heavily infested with both medusahead rye and cheatgrass. Additionally, the infestation spreads and / or increases with each subsequent wildfire in the area, which further threatens this Special Status plant species.

The District has only a partial map of the extent of invasive annual grasses, but it is reasonable to expect their presence on tens of thousands of acres of recently (2007-2012) burned habitat within the District. It is unknown exactly how many acres of Special Status plant populations are affected by invasive annual grasses. About 390 acres of Special Status plants occur within previously burned areas of the District, primarily Malheur prince's plume. Cheatgrass is listed on the BLM monitoring reports for all these populations. The density of cheatgrass is not reported, but is likely to increase if disturbances occur within these populations.

Proposed Action

Effects of invasive plants would be similar to the No Action Alternative except that the noxious weed rate of spread and future infested acres are predicted to be reduced about 40 percent when compared to the No Action Alternative (see *Invasive Plants* section earlier in this Chapter). This reduced spread lowers the acreage of Special Status plant habitat that would be affected each year and reduces the risk of new invasive plant introductions into previously un-infested Special Status plant populations.

The ability to treat invasive annual grasses has the potential to reduce competition with Special Status plants and reduce the risk of wildfire in Special Status plant habitat. The herbicides available under this alternative would make cooperative projects with adjacent landowners more feasible, resulting in better protection for Special Status plant communities both on and off BLM-administered lands.

Beneficial Effects of Invasive Plant Control

Overall, the main benefit to Special Status plants from controlling invasive plants is the protection of current habitat from invasive plants by reducing competition from invasive plants and freeing up valuable resources to be utilized by native species, including Special Status plants. Additionally, by controlling invasive annual grasses, the risk of loss due to wildfire would be reduced. Both benefits reduce the probability of Special Status plant species trending towards listing.

Cumulative Effects

Common to Both Alternatives

Invasive plants have altered habitat and compete with Special Status plants for limited resources. Under both alternatives, the control of invasive plants and restoration of invasive grass dominated areas would benefit Special Status plant species and their associated habitat. Controlling invasive plants that occur outside of Special Status plant populations would limit the need for treatment activities within these populations, because if left unchecked, invasive plants could spread into these populations.

The reasonably foreseeable actions included in Table 3-3, *Foreseeable Actions Potentially Relating to Cumulative Effects* typically require project level botanical clearances to avoid negative impacts to Special Status plants. Where conflicts are identified, projects are modified or mitigation is implemented to insure the long-term viability of Special Status plant populations. For example, grazing exclosures have been established around Special Status plant populations where declines due to livestock use were identified. Mining activities are subject to similar analysis and Mitigation Measures, but prospecting can cause effects similar to those from ATVs and cattle.

Increases in abundance of cheatgrass following juniper removal have been documented (Bates et al. 2000) and effective control measures available under the Proposed Action would help limit the spread of cheatgrass and other invasive plants into treated areas. Invasive plant management activities already occurring in conjunction with the juniper removal projects would reduce the negative effects to Special Status plants. Cumulatively, these actions would improve protection of Special Status plants as steps are taken to identify and protect them against damage or habitat encroachment.

Soil Resources

Issues

- How would the alternatives affect biological soil crusts?
- Are there soils / conditions where particular herbicides included in the alternatives could be transported off site?
- What are the effects of herbicides on soil function?

Affected Environment

Biological Soil Crusts

Biological crusts are a combination of bacteria, algae, mosses, and lichens. They have a complex distribution as each individual component may have different abilities to colonize and utilize a particular soil area. Distribution is a function of seven factors that interrelate with one another: elevation, soils and topography, disturbance, timing of precipitation, vascular plant community structure, ecological condition, and microhabitats (USDI 2001). Total crust cover is high when elevation is low (below 3,000 ft.). Some increase in distribution occurs as elevation increases but vascular plant cover precludes their growth; biological soil crust distribution is highest when vascular plant cover is low. Crust cover is also highest when soil depth is shallow and soil texture is fine. Stable or embedded rocks near or at the soil surface can increase the percent crust cover by perching water and armoring the surface from physical disturbances (USDI 2001:18).

Biological soil crusts are identified throughout the District. Also known as cryptogamic, cryptobiotic, biological, or microphytic soil crusts, they are found on Aridisols, Mollisols, and Inceptisols. They do not appear on Entisol soils, as these soils tend to be too sandy, wet, or unstable for crust development. The most critical physical factor for biological soil crust establishment is the presence of fine-textured surface soils such as silts, silt loams, and non-shrink / swell clays (USDI 2001). Other factors that determine biological soil crust presence and development include, but are not limited to dominant shrub type, herbaceous plant density and form, annual precipitation, historical fire return, and current ecological condition. The District is dominated by plant communities that have a high potential for biological soil crust cover. However, sites where vegetation structure has been modified due to introduction of invasive plants or heavy grazing would have reduced potential for biological crusts (USDI 2003:38). The actual extent of biological soil crusts on the District is not mapped.

Biological soil crusts contribute to soil stabilization by reducing wind and water erosion of soil surfaces. Biological soil crusts play an important part in ecosystem processes, such as carbon and nitrogen fixation, soil-water evaporation, seed germination time, and seedling growth rates. In addition to holding soil in place and restricting the amount of erosion, biological soil crusts also influence the type of material eroded from the soil. Laboratory studies showed that water erosion resulted in the erosion of mainly fine soil particles (silt and clay) from a sparsely covered crust surface, while the extensively covered surface lost only coarse sand. Since most soil nutrients are bound onto the silts and clays, the loss of these fine particles represents a reduction in soil fertility and hence, productivity. Wind erosion would be expected to have similar erosional effects (USDI 2001).

Soils

The landscape throughout the Burns District is dominated by basins, tablelands, and mountains. Soils are formed predominantly in lacustrine (old lake) sediments in the basins and in residuum (rocky parent material) on tablelands and mountains. Alluvium (water-moved material) and colluvium (slope-moved material) are common especially in dissected or steep landforms. Table 3-13 shows the general soil types and their landscape characteristics. Specific soil properties relevant to invasive vegetation treatment are described and quantified separately, in the *Environmental Consequences* section below. Soils data for Burns District comes from the Harney County detailed soil survey.

Table 3-13. General Soil Types and their Landscape Characteristics

General Soil Types	Landform	Parent Material	Precipitation (inches)	Elevation (feet)	Major Limitations	Burns BLM Acres	Percent of District
Alvodest-Droval-Playas	Low lake terraces and basin floors	Lacustrine sediments	7-10	4,000-4,600	Ponding, Alkalinity, Salinity	129,541	4
Catlow-Tum-Tum-Deppy	High lake terraces and low hills	Old alluvium, residuum, or colluvium	7-10	3,400-5,300	Hazard of water erosion, shallow soil depth, low available water capacity	253,596	7.7
Spangenburg-Enko-Catlow	Middle lake terraces	Lacustrine sediments and alluvium	8-10	4,200-5,300	Hazard of wind erosion	204,640	6.2
Fury-Skunkfarm-Housefield	Lake plains	Lacustrine sediments	8-10	4,000-5,100	Wetness, ponding	5,136	0.2
Poujade-Ausmus-Swalesilver	Lake terraces and lake plains	Lacustrine sediments and alluvium	8-10	4,000-4,500	Wetness, ponding, alkalinity, salinity	40,792	1.2
Felcher-Skedaddle	Mountains and hills	Colluvium and residuum	8-12	4,100-7,100	Hazard of water erosion, shallow soil depth, low available water capacity and steepness of slope	113,875	3.5
Reallis-Vergas-Lawen	Lake terraces and fans	Alluvium	8-12	4,000-6,000	Hazard of wind erosion	117,782	3.6
Raz-Brace-Anawalt	Tablelands	Residuum and colluvium	8-12	4,100-6,200	Shallow soil depth, low available water capacity, hazard of water erosion	1,054,301	32.2
Gumble-Risley-Mahoon	Hills and tablelands	Residuum and colluvium	9-12	3,400-4,800	Hazard of water erosion, shallow soil depth, low available water capacity	121,178	3.7
Ninemile-Westbutte-Carryback	Plateaus, hills and mountains	Residuum and colluvium	12-16	4,000-7,000	Steepness of slope, shallow soil depth, hazard of water erosion	560,450	17.1

General Soil Types	Landform	Parent Material	Precipitation (inches)	Elevation (feet)	Major Limitations	Burns BLM Acres	Percent of District
Merlin-Observation-Lambring	Shrub and grass covered hills and mountains	Residuum and colluvium	12-16	4,900-6,600	Steepness of slope, shallow soil depth, hazard of water erosion	395,142	12.1
Baconcamp-Clamp-Rock outcrop	Mountains	Colluvium	12-40	5,100-9,200	Steepness of slope, hazard of water erosion, short growing season, shallow soil depth	184,097	5.6
Gaib-Anatone-Royst	Forested hills and mountains	Residuum and colluvium	14-18	4,000-6,000	Steepness of slope, surface rock fragments, shallow soil depth, hazard of water erosion	39,595	1.2
Other (water or out of survey area)						43,531	1.3

Soils and Invasive Plants

Invasive plant populations are located on all soil types. It is, however, well established that some invasive plants favor particular environments or specific soil types to germinate, grow, reproduce, and out-compete native plants. For example, medusahead rye appears more commonly on clayey, drier soils, Canada thistle favors deep moist soils, whitetop prefers soils with alkaline pH and disturbed sites and cheatgrass prefers well-drained, but not high salt soil conditions. Maps 2-7 shows areas potentially vulnerable to medusahead rye invasion on the Burns District, more than 886,000 acres on BLM-administered lands. These include areas dominated by soils with clayey surface textures (more than 27 percent clay) where precipitation averages 18 inches or less and drainage is neither poor nor excessive.

Erosion and the Potential to Transport of Herbicides Off-Site

Water erosion is the detachment and removal of soil particles by water. Wind erosion removes soil particles under certain conditions of low vegetative cover, dry soils, high percentage of silt and fine sands, and sufficient wind velocity. Herbicides bound to soil particles can be transported off-site by blowing soils or soils washed off-site by rainfall, negatively affecting non-target areas. Factors affecting how tightly herbicides bind to soil are described in more detail in the *Fate of Herbicides in Soil* section under *Environmental Consequences* below.

Vegetation is the most significant factor in controlling both wind and water erosion because it intercepts precipitation, improves infiltration, reduces rainfall impact, restricts overland flow, and reduces wind velocity. Bare ground, especially on steep slopes, contributes to the risk of water erosion risk factor. Bare ground, in combination with dry soils on large flat expanses (such as lake terraces and plains), contributes to the risk of wind erosion.

On the Burns District, on BLM-administered lands, there are about 1,485,000 acres (46 percent) with moderate to severe risk of water erosion and about 557,000 acres (17 percent) with moderate to severe wind erosion risk. These areas are displayed on Map 3-3.

Every year there are wildland fires on the Burns District, sometimes burning thousands of acres (see Table 2-4, *Summary of Recent Wildfire*). The exposed soil surface is especially vulnerable to wind and water erosion regardless of soil type. High rainfall events are not as common in southeast Oregon as elsewhere in Oregon, but excessive rain events associated with thunderstorms do occur during the fire season.

Treatments Planned Related to the Issues

Biological Soil Crusts

Virtually all herbicide treatments in Categories 1 – 3 are ground based, being either spot spray from backpacks, or spot and boom sprays from ATVs or on-road vehicles. Many of these applications would be made from roads and other disturbed surfaces, but some ATV and foot traffic would be in areas with soil crusts. Manual, mechanical, and especially targeted grazing methods would also be in areas with soil crusts.

Soils

While all of the treatments planned for both alternatives would be made on or over a soil, most of the Categories 1-3 treatments would be on small sites. Only 36 of 6,857 documented sites are larger than 100 acres, and even in those, invasive plants may not be continuous and other vegetation is often present. The herbicides expected to be used to treat all 26,000 acres of Category 1 invasive plants are summarized on Table 3-1, *Estimated Treatment Acres*, in the *Invasive Plants* section early in this Chapter. In some areas in the No Action Alternative, and in all areas in the Proposed Action, there would be large-scale treatments of invasive annual grasses (on 240,000 to 773,500 acres), primarily using the herbicide imazapic. Prescribed fires or seeding are not planned on these areas (in this analysis), but targeted grazing (on as much as 15,000 to 42,500 acres) could be.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

Mechanical, Manual, and Chemical Methods

- Minimize disturbance to biological soil crusts (e.g., by timing treatments when crusts are moist).
- Reinoculate biological crust organisms to aid in their recovery, if possible.

Chemical Methods

- 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 percent 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 with soils having high wind erosion risk 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[55] so cover is present before the windy or rainy season; 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 or water erosion on these soil groups.

Environmental Consequences

Effects of Treatment Methods to Biological Soil Crusts

[55] Seeding is not analyzed as part of this EA.

Effects are described in terms of the intensity, spatial, and temporal scales of the impacts. Spatial boundaries define areas or sites that may be affected by the proposed management actions. For the District, "local effects" refers to individual treatment sites where soil crusts are directly disturbed or impacted.

How long a management action would affect biological soil crusts is the duration of effects. If short-term, the effects are anticipated to occur within five years of project implementation. Long-term effects would occur beyond five years of project implementation. The intensity of management action impacts may vary within treatment areas due to reoccurring treatments in the same areas. If manual pulling of the same area occurs on the same site for several years in a row, biological soil crusts would be disturbed and / or removed each time. If herbicides are applied to an area aerially and no retreatment is needed, the impacts on biological soil crusts are greatly reduced, as recovery is not interrupted.

The magnitude of effects ranges from negligible to moderate. "Negligible effects" on biological soil crusts would be at or below the level of detection, whereby "moderate effects" would be readily apparent such as biological soil crust breakage and would likely require some mitigating measures to offset adverse effects. "Major effects" on biological soil crusts would be readily apparent, long-term, and would substantially change the character of the soils over a large area. Extensive mitigating measures to offset adverse effects would be needed, and their success could not be guaranteed.

Non-Herbicide Treatments

Manual

Manual methods such as pulling or digging to control invasive plants have negligible to moderate effects on biological soil crusts, depending on the scale of activity. Manually digging and pulling invasive plants are expected to result in localized short-term ground disturbance primarily due to foot traffic and tool use. Effects of manual invasive plant treatments are more likely to be realized on biological soil crust communities. Pulling and digging invasive plants can result in trampling and dislodging susceptible biological soil crusts, particularly when the crusts are dry. To reduce disturbance and potential damage to biological soil crusts, Standard Operating Procedures require mechanical and manual treatments to minimize disturbances to biological soil crusts (e.g., by timing treatments when crusts are moist).

Mechanical

Mechanical control methods, including the use of weed whackers, chainsaws, and mowers, would be expected to result in negligible to moderate localized short-term effects to biological soil crusts. Ground disturbance would be due primarily to foot traffic or the use of off-highway vehicles to transport equipment or workers.

Targeted grazing

Many studies and established programs show that grazing invasive plants at a specific time, duration, and intensity can effectively reduce their abundance (Davison et al. 2005). Impacts to biological soil crusts by targeted grazing would vary by season of use, length of grazing period, and number of grazing animals, which would determine whether there would be negligible, moderate or major effects. Crusts on all soil types are least vulnerable to disturbance when soils are frozen or snow covered. Biological crusts on sandy soils are less susceptible to disturbance when moist or wet; on clay soils, when crusts are dry (USDI 2001). However, grazing turnout in early spring is the most ideal for sites containing biological soil crusts. Biological soil crusts are the most resistant to disturbance under moist springtime conditions.

Prescribed Fire

Prescribed burns would have minimal effects on biological soil crusts due to reduced heating in the upper most layers of the soil profile. Johansen et al. (1993) observed that biological soil crusts structural matrix was left intact following low-intensity fire, indicating that a lightly burned crust still functions to maintain soil stability against erosive forces for both vascular plants and biological soil crusts during the recovery period. A recent study explored the effects of a controlled burn on crusts at a site in the foothills of the Onaqui Mountains in Utah. The results indicate that low-intensity fire has few long-term adverse effects. The recovery of soil crusts in a good rain year after a light fire was fairly quick (FSB 2009).

Herbicide Treatments

Studies of direct impacts of herbicides (glyphosate or 2,4-D) on biological soil crusts by Youtie et al. (1999) and Metting (1981) have demonstrated in laboratory settings that there is a wide range from positive, neutral or negative effects. One study addressed the effects of glyphosate on moss-dominated biological soil crusts and determined there were no short-term negative impacts on bryophyte cover (Youtie et al. 1999). However, the authors provided caution stating that the results were not conclusive and extrapolating this information to the field may not yield that same response.

Adverse Effects by Alternative

Common to Both Alternatives

Biological Soil Crusts

The effects to biological crusts are largely confined to the breakage and disturbance of the actual crusts caused by manual methods or the expected disturbance that is incurred while applying chemicals to the treatment areas.

For both alternatives, the application of herbicides does not change the fate of biological soil crusts on the soil. The Proposed Action does not contain herbicides found to affect these crusts more than the No Action Alternative. Given the prediction that having a wider suite of herbicides would reduce the need to retreat similar locations, the mechanical disruption affects outlined below may be more widespread in the No Action Alternative.

The stated risk to this issue is the disruption and degradation of the biological soil crusts. Using the definitions found in the *Effects of Treatment Methods to Soil Resources* earlier in this section, the intensity may vary from extremely low (aerial application using aircraft) to moderate (multiple treatments of the same ground with ATV sprayers). The acreage is small, currently about 3,000 acres per year for Categories 1-3, and up to 100,000 acres per year for Categories 4 and 5 (the latter is mostly aerial), compared to the total District of 3.276 million acres. The treatment affects would be short and longer term depending on retreatment frequency and methods. Those areas where multiple applications of herbicides are required over three or five years may have two very different effects. The first is short term, when herbicides are directly applied to biological soil crusts. However, the second effect, the potential destruction and displacement of those same crusts, would require decades or longer to rebuild if reoccurring vehicle tread traffic breaks up the crust and recovery cannot occur. Therefore, the magnitude of the impact may be negligible at the District level (3.276 million acres) and moderate at a treatment site (less than one meter to 1,000 acres depending on the site. See Table 3-4, *Summary of Invasive Plants by Infestation Size*).

Soils

Herbicide transport off site – Both alternatives propose herbicide application on tens of thousands of acres. Since almost half of the Burns District has moderate or severe water erosion potential and 17 percent has moderate or severe wind erosion potential, there would be herbicide application on these areas. Standard Operating Procedures limit applications on steep sites when there is a high risk for severe wind or rain events or when soils are dry and prone to aerial drift.

Herbicide effects on soil function – Soil microorganisms are crucial to proper soil functioning in the ecosystem. Herbicides probably affect few soil organisms directly, but there is limited research on the toxicity of many herbicides to most soil organisms (USDI 2010a:178). With the exception of imazapic, the total estimated treatment acreage and extent of any one particular application is very small compared to the total acreage of the District. Imazapic is persistent in acidic soils. Soils in the Burns district that are acidic (pH < 6.6) are associated with high organic matter contents generally greater than 75 percent. These soils are confined to an area north of Highway 20 with a concentration around the Silvies area on Highway 395 and a third area north and south of the Narrows east of Highway 205.

Fate of herbicides in soil - 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 other parameters (climate and vegetative cover). Permeability and organic matter adsorption are generally the same for both alternatives. Other factors, including clay adsorption and soil acidity, vary by alternative and are discussed further in the *Adverse Effects by Alternative* section below. Table 3-14 summarizes parameters affecting of the fate of herbicides in soil for each of the herbicides in the No Action and the Proposed Action Alternatives.

Soil permeability affects how quickly an herbicide can leach through the soil and potentially reach groundwater before it has time to degrade. Soils that are sandy or gravelly throughout the soil profile may have high permeability as well as low adsorption affinity. Map 3-2 shows areas dominated by such soils, about 255,000 acres (1 percent) on public lands within the Burns District. Table 3-14 provides the ratings by herbicide for leaching potential. While many of the herbicides included in the alternatives have a high rating, there is little leaching if the soil does not have high permeability. Since highly permeable soils are rare on the Burns District, leaching of herbicide is considered a negligible effect. In the cases where herbicide does leach down through the soil, the main risk is that it reaches water. Map 3-4 includes areas of persistently high water table on the Burns District. These areas comprise about 76,000 acres (less than 1 percent) on BLM-administered lands.

Organic carbon (organic matter in the soil) would also bind herbicides. Table 3-14 shows how herbicides vary in their affinity to soil organic carbon (K_{oc} column). High soil organic matter is rare on BLM-administered lands within the Burns District. Organic matter greater than 1 percent occurs only on Mollisols (productive soils with dark, high organic matter surface horizons) and found in higher precipitation zones. Even these would rarely reach 2 percent, which is considered below the effect threshold (USDI 2010a:176). Map 3-4 shows the location and extent of these soils, about 79,000 acres (less than 1 percent). Organic carbon binding of herbicides is a negligible effect for the Burns District.

Soil adsorption affinity refers to how easily and how tightly the soil attracts and holds chemicals applied to it. Clay particles have negative charges on their surface that bind the positive ions in herbicides. Surface textures rather than full profile texture is more important. Map 3-2 shows areas on the Burns District dominated by high clay (more than 27 percent clay) surface textures, about 911,000 acres (28 percent). Herbicides included in this analysis with a high affinity to bind to clay are degraded rapidly by soil microbes, although binding is reduced for the non-acidic soils typical on the Burns District. Some of the proposed herbicides have a tendency to bind to soil organic carbon and become more mobile in the soil, but soils with high organic carbon comprise less than one percent of the Burns District.

Herbicides that are bound to soil (on either clay particles or organic carbon) have the potential to move off-site through erosion. Table 3-14 provides a risk rating for each herbicide for "Adsorbed Particle Runoff." Herbicides that stay in water solutions might run off the soil or leach down through the soil. The "Leaching" and "Solution Runoff" risk rating for each herbicide are also provided in Table 3-14.

Soil acidity (low pH) or alkalinity (high pH) affect degradation rate of some herbicides. In general, the higher the pH, the slower the herbicide breaks down. Acidic soils are rare on BLM-administered lands on the Burns District, but alkaline soils are present. The highest pHs are found in Natric soils, which are clayey as well as highly alkaline (sodic). Map 3-4 shows areas with Natric soils, about 80,000 acres (<1 percent) on BLM-administered lands.

Table 3-14. Fate of Herbicides in Soil

Dark background indicates that the herbicide is available for use on noxious weeds district-wide under the No Action Alternative.
Light background indicates that the herbicide may be available for use on invasive plants in limited areas under the No Action Alternative (see EAs on Table 2-7 and Map 2-8).
All 14 herbicides are available for use district-wide on invasive plants under the Proposed Action.

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 (Not Persistent)	Inter mediate	Inter mediate	Inter mediate
Chlorsulfuron	40	40 mL / g	Relatively rapid degradation by microbial and chemical actions, trace amounts have extreme bioactivity (Moderately Persistent)	High	High	Inter mediate
Clopyralid	40	6 mL / g, ranges to 60 mL / g	Biodegradation, photo degradation, and hydrolysis are the primary mechanisms that remove diflufenzopyr from soil (Non-Persistent)	High	Inter mediate	Low
Dicamba	14	2 mL / g	Mobile in soil but is easily degraded by microbes (Non-Persistent)	High	Inter mediate	Low
Diflufenzopyr	2 to 14	18 to 156 mL / g (aver. 87)	Biodegradation, photo degradation, and hydrolysis are the primary mechanisms that remove diflufenzopyr from soil (Non-Persistent)	Not Rated	Inter mediate	Not Rated
Fluridone	21	1,000 mL / g	Fluridone adsorption to soil increases with clay content, organic matter content, cation exchange capacity, surface area, and decreasing pH (Non-Persistent)	Not Rated	Not Rated	Not Rated
Glyphosate	47	24,000 mL / g	Tightly adsorbed to soil and rapidly degraded by microbes, thus no soil activity (Moderately Persistent)	Very Low	Inter mediate	Low
Hexazinone	90	54 mL / g	Soil organic matter content does not affect adsorption. Relatively low affinity for soil particles and dissolves in soil water. Bio-degradation is an importation fate (Moderate to Persistent)	Not Rated	Not Rated	Not Rated
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)	Inter mediate	Inter mediate	Low
Imazapyr	25 to 141	100 mL / g	Adsorption is affected by aluminum and iron in soil more than by clay and organic matter, subject to microbial degradation except in cool temperatures (Moderate to Persistent)	High	High	Inter mediate

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)
Metsulfuron methyl	30	35 mL / g	Hydrolysis and microbial degradation, with the latter being the only major pathway in alkaline soils (Non-Persistent)	High	High	Inter mediate
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	Inter mediate
Sulfometuron methyl	20	78 mL / g	Relatively rapid microbial and chemical degradation. However trace amounts can be significant due to extreme bioactivity (Non-Persistent)	Inter mediate	High	Low
Triclopyr	46	20 mL / g (salt) 780 mL / g (ester)	Degradation occurs primarily through microbial metabolism, but photolysis and hydrolysis can be important. As plants die, release of triclopyr to the soil can occur and it can then be taken up by other plants (Moderately Persistent)	High	High	Inter mediate

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.

No Action Alternative

Biological Soil Crusts

This alternative would primarily treat documented noxious plant sites and their spread, which are often along roads or disturbed areas. These areas may already have undergone disturbance to the biological soil crust and in these areas it is expected that if disturbance continues, crusts will stay in early-successional stages (i.e., cyanobacteria only) (USDI 2001:21). Given that funding limits treatments, and most treatments are spot treatments, the impacts to biological soil crusts would be extremely low in intensity, local for spatial extent, and short-term in temporal scales. Therefore, the magnitude of the impact would be negligible at District level and negligible at the local level.

Effects for those areas where imazapic is approved (see Table 2-7, *Summary of NEPA Covering the No Action Alternative*) would be similar to effects described for the Proposed Action below.

Soils

Erosion and Potential Transport of Herbicides Off Site: Of the herbicides included in this alternative, only imazapic has the potential for application over large areas. The smaller extents (a few acres or less) common to the other herbicide applications are not likely to contribute to wind or water erosion and subsequent transport of herbicides off site. Estimated treatment area for imazapic under the No Action Alternative is 240,000 acres over the life of the EA. Standard Operating Procedures reduce or eliminate the potential for soil erosion from these treatment areas. Therefore, adverse effects from erosion or herbicide transport off-site are unlikely.

Soil Properties Effects on Herbicide Transport Off Site: Of the herbicides included in the No Action Alternative only three (glyphosate, imazapic, and picloram) are generally tightly adsorbed to soil. Glyphosate is rapidly degraded by microbes, and imazapic adsorption is decreased with the higher pH of soils typical on the Burns District. Picloram can be persistent in the soil, which is very helpful if the objective is to treat the following years' emerging seedlings. The total estimated treatment area is less than 8,000 acres but that characteristic of persistence is what makes picloram useful in those specific situations.

Herbicide Effects on Soil Function: Two herbicides , chlorsulfuron (available for use in limited areas) and picloram have some effect on soil microorganisms, generally reducing but not eliminating local populations for a few days up to three weeks (USDI 2010a: 178). Combined estimated treatment area is less than 17,000 acres or 0.01 percent of BLM-administered lands on the Burns District and this, for this duration, is considered a negligible effect on soil.

Proposed Action

Biological Soil Crusts

This alternative adds an additional component of up to 100,000 acres of invasive annual grass treatments per year in Categories 4 and 5, treated mostly with imazapic. The majority of these acres would not result in extensive disturbance to biological soil crust as access to the treatment areas would be primarily along established roads and applications would generally occur by aircraft. Some ground disturbance can be expected to occur in areas where it has not been previously disturbed, and where off-highway vehicles are used for application. These areas may later need retreatment. The repeated use of the same access points or ATV trails would reduce the likelihood that recovery of soil crusts will occur, thus the impact may increase due to retreatments.

The overall treatment level of up to 100,000 acres per year would be less than two percent of the total resource land base; the magnitude of the impact would be negligible at the District level but may reach moderate at the local level especially where reoccurring treatments take place over subsequent years.

Soils

Erosion and Potential Transport of Herbicides Off Site: Estimated total treatment area for imazapic under the Proposed Action is 773,500 acres over the life of the EA. Standard Operating Procedures reduce or eliminate the potential for soil erosion from these treatment areas

Soil Properties Effects on Herbicide Transport Off Site: Of the additional herbicides included in the Proposed Action alternative only two, imazapyr and triclopyr, can be persistent in the soil. The estimated treatment area for these is less than 20 acres, and the estimated treatment area for picloram is reduced from 8,000 acres under the No Action Alternative to less than 3,600 acres.

Herbicide Effects on Soil Function: Three herbicides, picloram, chlorsulfuron, and metsulfuron methyl have some effect on soil microorganisms, generally reducing but not eliminating local populations for a few days up to three weeks (USDI 2010a: 178). Combined treatment area is less than 17,200 acres and this, for this duration, is considered a negligible effect on soil.

Beneficial Effects of Invasive Plant Control

Biological Soil Crusts

Overall, beneficial effects to biological soil crusts would occur with the management of invasive annual grasses. These grasses occupy the same interspaces historically filled by biological soil crusts, preventing the establishment, expansion and continued longevity of biological soil crusts. With the suppression and management of the spread

of invasive annual grasses, the ecosystem functions performed by biological soil crusts would remain intact in areas not impacted. In areas impacted by invasive annual grasses, treatments would allow biological soil crusts an opportunity to recover beyond the early successional stage of cyanobacteria.

Soils

Invasive plants alter vegetation types and organic matter levels (both on and within the soil). Invasive plants can out-compete native vegetation and lead to increased soil exposure; resultant increased erosion would remove soil and nutrients (USDI 2010a: 185). In addition to this indirect effect, invasive plants can directly deplete soil nutrients and water at higher rates or earlier in the growing season than native species (Olson 1999 in USDI 2010a: 186).

Noxious weeds infestations have been shown to increase soil erosion in comparison to soil occupied by native grass species (Lacey et al. 1989).

Cumulative Effects

Biological Soil Crusts

The actual soil disturbance from invasive plant control under either alternative a minimal addition to grazing on over three million acres of the District, juniper restoration, prescribed burning, mining, and other activities (see Table 3-3, *Foreseeable Actions Potentially Relating to Cumulative Effects*) and would not add substantially to the cumulative negative effects on biological soil crusts. Recent wildfires have been of such severe intensity that all biological material is removed, including biological soil crusts. Prescribed fires associated with future invasive annual grass rehabilitation treatments (not part of this analysis) would have a higher potential for impacts to biological soil crusts, but the potential of such treatments to reduce wildfire intensity and frequency would likely more than make up for such effects. The improved protection of native ecosystems would make up for the increased risk to biological soil crusts from implementation of the Proposed Action, when compared to the No Action Alternative.

Soils

Herbicide effects to soil resulting from treatments on adjacent, non-BLM-administered lands, is considered negligible. Herbicide effects resulting from Burns District foreseeable actions are covered under this EA.

Additional erosion effects to soil that are not related to herbicide application are possible. The greatest potential adverse effect is erosion associated with bare ground after wildland fire, which is an unknown future effect. Rehabilitation efforts after a fire may introduce some erosion, but the overall effect is to reduce erosion. Restoration projects designed to reduce hazardous fuels, restore plant communities or improve habitat may likewise cause some initial, short-term erosion, but the extent of actual ground disturbance is relatively small.

Water Resources

Issues

- How would the alternatives affect surface water quality including sediment, temperature, dissolved oxygen, and chemical contamination?
- How would the alternatives affect the safety of drinking, irrigation, or stock water?

- How would the alternatives affect bioaccumulation of herbicides in hydrologic systems including groundwater and streams?
- How would the alternatives affect stream channel stability and structural complexity?

Affected Environment

Surface and Ground Water Resources

Subbasins

The Burns District is comprised of nine sub-basins or hydrologic unit codes (known as sixth field HUCs). The majority of the District planning area falls into six of these sub-basins: Guano, Harney / Malheur Lakes, Alvord Lake, Donner und Blitzen, Silver, and Silvies. These sub-basins comprise a closed basin system that does not connect to the Snake River Plain or the Klamath River Basin and therefore, without a surface outlet for precipitation; water is lost through percolation or evaporation only.

The three remaining sub-basins that are not part of the closed basin system are:

- The Crooked-Rattlesnake sub-basin is part of the Middle Snake sub-region and the Pacific Northwest region. It drains into the Snake River via the Owyhee River.
- The Upper Malheur sub-basin is part of the Middle Snake sub-region and is a tributary to the Snake River.
- The Thousand Virgins sub-basin is part of the Black Rock Desert-Humboldt region and the Great Basin region.

The District contains approximately 8,285.5 miles of streams and drainages of which 639.1 miles are perennial and the rest are intermittent, ephemeral, or dry. There are 63,975 acres of flat-water (lakes and reservoirs). Some of the larger reservoirs and lakes include Chickahominy, Moon, and Warm Springs reservoirs, and Alvord, Harney, Malheur, and Mud lakes

There are no municipal watersheds located on BLM District lands. Groundwater is used for irrigation, domestic, wildlife, and livestock use. There are some private landowners in the area that drink spring water as their domestic source of potable water, some of this water may originate on BLM-administered lands. In this very rural area, the number of households that drink spring water as domestic water is not known. BLM makes no claims as to the quality of untreated spring water for drinking purposes and private landowners drink at their own risk.

Streams and Surface Water

Streams on the District originate in the higher elevation hills and surrounding mountains including the Malheur National Forest, Steens Mountains, Trout Creek Mountains, and Pueblo Mountains. They then flow to the lower elevation valleys, lakes, wetlands, and playas. Most surface runoff is from snowmelt or rainfall at the higher elevations, producing peak discharges in the spring. Year-to-year variability in precipitation influences stream flow both in quantity and in duration. Water scarcity has led to increased water storage, water diversions, and groundwater withdrawal associated with irrigation. These projects have significantly altered natural flow regimes, which has changed habitat conditions, channel stability, and timing of sediment and organic material transport. Throughout the District, stream flows have been altered by management activities, such as water impoundments, water withdrawal, road construction, and agricultural activities.

Ground water

Groundwater is particularly valuable on the District because of the closed basin system and the limited surface water. Regional groundwater gradients and aquifer systems have not been extensively studied. Groundwater data are limited and are based on isolated studies and well logs. Groundwater occurs as both confined and unconfined

aquifer systems. Most unconfined aquifers are located in stream valleys or associated with Pleistocene lakebeds that contain recent alluvial material, although some may exist as perched aquifers. Alluvial aquifers vary greatly in size and yield. These aquifers are important as transient storage systems to move groundwater to or from streams and the deeper confined aquifers. Some perched aquifers occur between the top of ridges and bottom of valleys and can usually be identified by the occurrence of springs above the valley bottoms.

Little is known of the real extent or depth of deep, confined bedrock aquifer systems. Neither the EPA nor the Oregon Water Resources Department has identified any sole-source aquifers or ground water management areas on the District. There is some groundwater influenced by geothermal heat sources, and the springs have hot, mineralized water. These types of springs have vegetation and microbial and algal fauna that are adapted to hot, mineralized water. Springs and seeps occur in areas where water from aquifers reaches the surface. Some springs begin in stream channels. Others flow into small ponds or marshy areas that drain into channels. Still others flow into lakes or reservoirs. Some springs and seeps form their own channels that reach flowing streams, but most lose their surface flow to evaporation or recharge the alluvial fill. Springs have been disturbed by management activities, such as livestock or wild horse grazing and watering, recreation use, and road construction. This affects the amount of water available.

Water Quality

Most of the District contains good water quality, but the water is usually hard and contains moderate amounts of dissolved minerals (USDI 2004). District lands contain 303(d) listed waters, including 99 listed stream segments. Temperature is the most widespread water quality impairment on District lands, and annual monitoring plans are created with this parameter in mind. Metals, bacteria (fecal coliform), and pesticides impair water quality on a few streams. No streams or water bodies on District lands are on the 303(d) list for herbicides. Groundwater quality depends on the chemical makeup of the water-bearing formation.

The BLM is obligated to fulfill the Agency's *Clean Water Act* responsibilities and provide assurance that management activities in 303(d)-listed water bodies would contribute to the maintenance of good water quality or restoration of poor water quality. This assurance is provided by documenting and implementing sufficiently stringent management measures during the planning and NEPA process and by developing and implementing water quality restoration plans. The management prescriptions in a water quality restoration plan are drawn from Federal standards, guidelines, and best management practices. The prescriptions in a water quality restoration plan apply only to Federal lands.

Herbicides were the most common pesticides found in several studies covering wide areas in Oregon to quantify pesticide presence in either surface or ground water (Barbash et al. 1999, Wentz et al. 1998, ODA 2008, ODEQ 2009a). A U.S. Geological Survey National Ambient Water Quality Assessment (NAWQA) study detected 2,4-D, bromacil, dicamba, diuron, glyphosate, and triclopyr in water samples in Oregon (Wentz et al. 1998)(USDI 2010a:193). . However, the Burns District has several unique conditions (deep ground water table, clay soils with a high pH, and a calcified layer between surface and ground water) that protect the groundwater from contamination, As previously mentioned, there are no 303(d) stream segments on the Burns District listed because of herbicides. The current water quality standards can be found at the Oregon Department of Environmental Quality's web site (ODEQ 2015).

Regulatory Framework

The U.S. Geological Survey organizes watersheds or drainage basins of the United States into a hydrologic system that divides and subdivides the United States into successively smaller watersheds. These levels of subdivision, used for organization of hydrologic data, are called "hydrologic units." The purpose for identifying watersheds in this section is to focus impact analysis on those watersheds with the potential for high levels of vegetation treatments.

Water resources are classified as surface water and ground water. The *Water Quality Act of 1987* (*Clean Water Act*) directs Federal agencies to meet State laws and regulations pertaining to beneficial uses of water identified by the State and applicable water quality requirements established to protect those uses. The primary beneficial uses of water on the District are irrigation, fisheries, recreation, livestock use, and maintenance of aesthetic quality.

Burns District Resource Management Plans also include riparian management direction and project design factors to protect and improve water quality and riparian function. The District follows INFISH (Inland Fish Strategy, USDA 1995b) direction for bull trout and its designated critical habitat. Standards and guidelines in INFISH strategies are designed to provide for the attainment of riparian management objectives, which improves and protects riparian areas and water quality. These are covered in detail in the *Riparian and Wetlands* section later in this Chapter.

A *Clean Water Act* (National Pollution Discharge Elimination System - NPDES) permit is required for herbicide use that may directly enter streams. The permit is needed for herbicide treatments within 3 feet of streams, wetlands, and other seasonally wet areas when water is present, including conveyances with a hydrologic surface connection to a water body (e.g. near a road culvert that runs water to a creek). Treatments on small portions of infestations (currently mapped or detected in the future) may meet the criteria. The current mapping is not refined enough to determine whether a permit would ultimately be needed; however, NPDES Pesticide General Permits would be obtained prior to implementing any treatments in which herbicide could be directly introduced into surface waters. This generally includes treatment within stream banks or for target plants that emerge from or overhang water bodies. Pollution control requirements would be satisfied by the project design features in this project.

Treatments Planned Related to the Issues

Common to Both Alternatives

Treatments described for each alternative in Chapter 2 have the potential to affect the water related issues identified for this analysis. Planned treatments, including those for riparian and uplands, have the ability to affect water resources when wind, drift, runoff, or subsurface water flow move unbound herbicides downslope into water. Because water is a limited resource on the District, invasive plants in, near, and around water are high priority for control treatments.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

Standard Operating Procedures and Mitigation Measures including limitations on the herbicides, adjuvants, carriers, handling procedures, application methods, drift minimization measures, and riparian buffers greatly reduce the likelihood that substantial amounts of herbicide would be transported to aquatic habitats, although some herbicides might enter streams through aerial drift, in association with eroded sediment in runoff, or dissolved in runoff, including runoff from intermittent streams and ditches. The potential for adverse herbicide-related effects to water resources is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include, but are not limited to:

- 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.
- 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.
- 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.
- Buffer intermittent stream channels when there is a prediction of rain (including thunderstorms) within 48 hours.

Environmental Consequences

Adverse Effects of Treatment Methods

Invasive plants can create or exacerbate conditions that reduce water quality. Invasive plants are difficult to control in and around water as they thrive in the moist environment. Invasive plants can affect water quality by affecting bank stability, sediment, stream temperature, dissolved oxygen, and pH (USDA 2005a), and can increase runoff and increase peak flows (Lacey et al. 1989 cited in Dewey et al. 1995)(USDI 2010a:202).

Herbicides Used for Aquatic Vegetation Control

Following (Table 3-15) is a summary of the potential risks to water resources from each of the 14 herbicides considered in this analysis. This summary was adapted from the Oregon EIS (USDI 2010a:194-198) and the Risk Assessments and risk ratings presented and described in Appendix C of this EA. Ratings are based on various plausible exposure scenarios, without the application of the Standard Operating Procedures described above and in Appendix A.

Table 3-15. Effects of Herbicides (Water Resources)

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, 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 moderate 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 soils, 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 effect on eutrophication.

Herbicides available under the Proposed Action	
Fluridone	Currently the District has no proposed aquatic plant application planned; however, if invasive aquatic plants were detected, fluridone could be applied to ponds, lakes, canals, and reservoirs. Fluridone has limited use in flowing water because it works through contact maintained over several weeks. Water quality is not degraded when fluridone is used at a concentration of less than 20 ppb, and there are no label restrictions against swimming, fishing, or drinking treated water (Washington Department of Ecology 2002). Whole-lake treatments using fluridone are possible because the herbicide does not cause a rapid plant kill, which would otherwise result in oxygen-depleted water and reduced water quality. Fluridone has low potential to leach to groundwater and is not known to contaminate groundwater. It does have high potential to be transported in surface runoff.
Imazapyr	Imazapyr is registered for use in aquatic systems to control emergent, floating, and / or riparian and wetland plants. Imazapyr is water soluble and potentially mobile (SERA 2011b). Imazapyr is rapidly degraded by sunlight in aquatic solutions, with a half-life of approximately 2 days that decreases with increasing pH (Mallipudi et al. 1991, Mangels 1991, all cited in Tu et al. 2001). Imazapyr does not appear to degrade in anaerobic systems, such as wetland soil or lake or pond sentiments, and will bind strongly to peat (American Cyanamid 1986). In their literature review of imazapyr, Tu et al. (2001) found no reports of imazapyr contamination in water, despite its potential for mobility. It is not known to be a groundwater contaminant. Battaglin et al. (2000) stated that little is known about its occurrence, fate, or transport in surface water or groundwater. In one study, imazapyr (from terrestrial applications) was detected in 4 percent of the 133 samples taken from streams, but was not detected in reservoirs or groundwater.
Triclopyr	The two forms of triclopyr, TEA and BEE, behave very differently in water. Both forms are used to control woody riparian vegetation. However, only the TEA form of triclopyr is registered for use for selective control of floating, immersed, and submersed aquatic plants. Both forms readily degrade to the acid form, which is the active form in plants. No adverse effects on water quality were observed following triclopyr TEA applications in two studies of whole-pond applications in closed systems (no water exchange; Petty et al. 2001). Triclopyr TEA is soluble in water and photodegrades in several hours with adequate sunlight. The rate of degradation in water is generally dependent on water temperature, pH, and sediment content.
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).
Picloram	Can move off site through surface or subsurface runoff, and has been detected in the groundwater of 11 states (Howard 1991). 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 and District-wide under the Proposed Action	
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).
Sulfometuron methyl	Degrades quickly by hydrolysis in acidic water, but is stable in neutral water. Biodegradation and photolysis are major loss pathways in aquatic systems, where hydrolysis rates generally are slow. Aquatic dissipation half-lives are estimated at 1 to 3 days to 2 months in aerobic systems, and several months in anaerobic sediments (Extoxnet 1996a). Sulfometuron methyl is not known to be a groundwater contaminant. In one surface water study, sulfometuron methyl was detected in 2 percent of 133 samples taken from streams.
Herbicides available under the Proposed Action	
Diflufenzopyr	Appears to be soluble, with transportation from surface runoff following application, particularly when diflufenzopyr is applied on soils with neutral to alkaline pH. However, based upon proposed uses, fate characteristics, and model predictions, the EPA does not expect diflufenzopyr to occur in drinking water in significant quantities (EPA 1999). Diflufenzopyr is not a known groundwater contaminant. Biodegradation, photolysis, and hydrolysis are important mechanisms in removing diflufenzopyr from aquatic systems. Its half-life is less than 1 month, with hydrolysis and photolysis rates higher in acidic environments. The aquatic dissipation half-life for diflufenzopyr is 25 to 26 days in aerobic and 20 days in anaerobic conditions. Diflufenzopyr's expected half-life in small ponds is estimated at 24 days. These factors suggest that diflufenzopyr would be removed from an aquatic environment relatively rapidly if contamination occurred (EPA 1999).
Hexazinone	Hexazinone and its degradates persist, are highly mobile, and are readily washed into surface waters. Hexazinone has been identified as a groundwater contaminant in seven states. The EPA requires a groundwater advisory on all product labels stating that hexazinone must not be used on permeable soils. In areas where irrigation water is contaminated with hexazinone or where groundwater discharges to surface water, hexazinone residues in water could pose a threat to plants. In surface water, hexazinone resists photo degradation (Neary et al. 1983 cited in Tu et al. 2001). Hexazinone does not bind strongly to particulates or sediments. The main method of degradation is by microorganisms in soils. The average half-life of hexazinone in soils and water is 90 days (Tu et al. 2001). Hexazinone has been detected in streams near terrestrial application sites up to 30 days after treatment, and reported in runoff up to 6 months post-treatment in a forestry dissipation study (Neary and Michael 1996, Michael et al. 1999). Neary et al. (1984, 1993, all cited in Tu et al. 2001) concluded that hexazinone was diluted in the mainstream flow to very low concentrations in forested watersheds.
Metsulfuron methyl	Stable to hydrolysis at neutral and alkaline pH and has a half-life of three weeks in acidic systems (Extoxnet 1996b). The persistence of metsulfuron methyl (initial concentration 10 µg/L) was investigated using in situ enclosures in a woodland/boreal forest lake, and the half-life was estimated at approximately 29 days (Thompson et al. 1992). Metsulfuron methyl is not known to be a groundwater contaminant, although it has a high potential to leach into the groundwater.

Adverse Effects by Alternative

Common to Both Alternatives

Effects of Aquatic Treatments: Restoring native vegetation would improve riparian stability where invasive plants like Canada thistle have colonized along stream channels and out-competed native species. However, invasive

plant removal by mechanical, manual, or chemical means could exacerbate stream instability as well as remove stream shading; these effects could last until the native vegetation replaced the treated vegetation and planting would be used as needed to shorten this time. Such treatments would not be inconsistent with 303(d) restoration plans. Where invasive plant control would remove plants significantly contributing to bank stability or stream shading, particularly along 303(d)-listed stream reaches, control would be delayed or phased as necessary while aggressive restoration efforts are undertaken. BLM policy requires restoration plans to account for these effects (USDI 2008a). Speeding restoration of such management-exposed stream banks with willow planting or other measures is a common BLM practice.

With the exception of potential increases in turbidity or temperature in the short term, none of the treatments under either alternative is expected to adversely affect the safety of drinking, irrigation, or stock water.

Standard Operating Procedures require that areas with shallow groundwater and areas of groundwater-surface water interaction be identified to reduce impacts to groundwater from the application of herbicides. These areas would be identified during preparation of the Annual Treatment Plans. In addition, springs known to be sources of potable drinking water that originate on BLM-administered lands and run onto private lands would be identified and avoided at that time.

Buffer distances and other Standard Operating Procedures for Water Resources (Appendix A) would minimize impacts to riparian vegetation and water quality. Impacts would be minimized in perennial and intermittent streams because they are protected by 10-foot (ground-hand), 25-foot (ground-vehicle), and 100-foot (aerial) buffers[56]. All herbicide use would follow label constraints and requirements.

Herbicide impacts to the ground water are determined by the application rate and how a specific herbicide reacts with the surface and subsurface soil and is transported (leached) to the water below the ground surface. The soils where the herbicides would be applied on the Burns District commonly have a deeper ground water table, high pH level, and contain a variety of clay that is conducive to slowing the rate of downward movement of the herbicide. These Burns-specific features, along with the calcified layer (i.e., caliche) found between the surface and the ground water, significantly aid to reduce the ground water impacts from herbicides. These unique features within the Burns District, and applicators making site-specific use decisions based upon the Standard Operating Procedures and product labels, would aid in preventing adverse herbicide effects to ground water.

No Action Alternative

The four herbicides used District-wide under this alternative include three known groundwater contaminants: picloram, dicamba, and 2,4-D (USDI 2010a:194-198). Picloram is a high-risk herbicide for aquatic resources but is preferred in many situations because it is a selective herbicide that represses reestablishment of target plants.

While glyphosate is available to treat emergent species such as knotweeds and yellow flag iris (not currently documented on the Burns District), no herbicides are available to treat submerged plants such as Eurasian watermilfoils and hydrilla (also not currently documented on the Burns District).

Proposed Action

Effects of Aquatic Treatments: Imazapyr has an aquatic formulation that is frequently used to control invasive plants in and adjacent to aquatic environments. Aquatic formulations of triclopyr would be used to control broadleaf species in riparian areas. Removing invasive aquatic plants can result in improved water quality where

[56] Intermittent stream channels (including ephemeral streams) are buffered when they have water in them, or if there is a prediction of rain (including thunderstorms) within 48 hours (USDI 2010b:14).

blooms of invasive plants lead to low dissolved oxygen, and where invasive plants within riparian areas have led to increased soil erosion and stream sedimentation.

Fluridone is an aquatic herbicide available to control submerged aquatics including Eurasian watermilfoils and hydrilla. This herbicide can only be used in still waters such as ponds and lakes. There are not any areas currently proposed for treatment with fluridone on the District, although if invasive submerged aquatic plants were found in the future, they would be a high priority for treatment. In Washington, fluridone is considered effective at controlling Eurasian watermilfoil without affecting drinking water quality or recreation (Washington Department. of Ecology 2002). Fluridone is slow acting, and is used at low concentrations on both submergent and emergent plants. As the plants die off slowly, there is not a large concentration of decaying organic matter added to the water at one time, and so it is less likely to deoxygenate the water than other aquatic herbicides.

No measurable effects to sediment, temperature, dissolved oxygen, or stream bank stability are expected from herbicide treatments in, near, and around water given the treatments planned and the limited extent of current infestations. Some level of chemical contamination may occur with the Proposed Action but the application rates and protection measures in place are expected to generally result in herbicide levels below levels of concern for aquatic organisms.

There is low risk to drinking, irrigation, wildlife, or stock water from treatment with imazapyr, glyphosate, triclopyr, or fluridone.

None of the parameters in 303(d)-listed waterbodies on the District would be measurably affected by the implementation of the Proposed Action. The Proposed Action is consistent with *Clean Water Act* as Standard Operating Procedures, Mitigation Measures, and other measures are designed to keep non-aquatic herbicides from getting into waters. For aquatic herbicides that are used to control invasive plants in, near, and around water, the benefits of controlling invasive plants before major adverse effects to aquatic habitat, water quality and amount, infiltration, and runoff occur, outweigh the risk of using herbicides not shown to pose a risk to aquatic systems.

Beneficial Effects of Invasive Plant Control

Water resources are extremely valuable to the ecosystem and must be protected from invasion by invasive plants. Invasive plant species, such as purple loosestrife or Canada thistle, can be extremely competitive in a riparian setting. They can crowd out valuable native species, forming a solid stand of invasive plants. Studies have shown that invasive plants often do not stabilize soils as well as native bunch grasses, which can lead to soil erosion resulting in lowered water quality and loss of the stream channel function (Sheley 1994).

The indirect effects or long-term consequences of invasive plant control would depend on the long-term progression of climatic factors and the success of follow-up management actions to exclude invasive plants from the action area, provide early detection and rapid response before such species establish a secure position in the plant community, eradicate incipient populations, and control existing populations. Reducing the number of invasive plants in, near, and around water resources would help to maintain water quality standards by promoting stream channel stability, decreasing sediment, and helping to maintain higher levels of dissolved oxygen by reducing invasive plants that have the potential to degrade water environments. In addition, it would eventually help to keep stream temperatures down by helping to retain native plants that provide shade, hold soils together, and add structural complexity to the environment.

Cumulative Effects

See *Cumulative Effects for Water Resources, Riparian and Wetlands, and Fish and Other Aquatic Resources* following the *Fish and Other Aquatic Resources* section later in this Chapter.

Riparian and Wetlands

Issues

- How would the alternatives affect the health and function of riparian and wetland areas?
- How would the alternatives affect riparian / wetland vegetation?

Affected Environment

Riparian / Wetland Vegetation

Riparian / wetland areas are water-dependent ecosystems bordering streams, springs, and lakes. They form ecological links between the terrestrial and aquatic components of the landscape. Riparian landform (flood plain), and vegetation and / or other structural components, such as woody debris and boulders, reduce erosion and dissipate stream energy or wave action (standing water) during high water events. Detention and storage of high flows reduce flood risks and contribute inflow during periods of receding water surface elevation or flow. Reduced bank erosion contributes to maintenance of water quality and general riparian integrity.

Riparian vegetation communities are influenced by landform, water availability, soil, elevation, and climate, as well as disturbance factors. These communities may consist of herbaceous or woody vegetation, or a combination of these two vegetation types. Presence and dominance are associated with the species' obligation or sensitivity to saturation, as well as the circumstances and conditions during which opportunities for establishment occur. Progression of a riparian community following changes in the physical characteristics of the site, particularly large changes in soil or water status, may result in a different Potential Natural Community (USDI 1992d).

Riparian vegetation communities on the Burns District range from dominant woody tree / shrub species adjacent to moderate gradient streams to monotypic stands of sedge or rush associated with springs, saturated meadows, and low gradient stream reaches. Commonly observed woody riparian plant communities include cottonwood-willow, alder-willow, mixed willow, willow-chokecherry, and aspen. These communities may exhibit further diversity with additional shrub or herbaceous species associated with colonization opportunities, such as localized bank disturbance, canopy openings, and increased solar exposure. Herbaceous communities such as grasses, rushes and sedges, are often associated with finer textured soils with species composition associated with the duration of saturation.

There are approximately 24,233 acres of riparian areas and wetlands on the Burns District, of which 2.8 percent are infested with documented invasive plants (Category 1).

Proper Functioning Condition

Across the district, the majority of public land riparian areas associated with perennial streams (about 60 percent) were assessed using the Proper Functioning Condition (PFC) assessment between 1997 and 2000. Functioning condition of riparian / wetland areas is a result of interactions among geology, soil, water, and vegetation. PFC is an assessment of the physical function of riparian / wetland areas through consideration of hydrology, vegetation, and soil / landform attributes. This assessment utilizes existing site-specific inventory and monitoring information, and helps identify management goals and future monitoring. Definitions of the PFC ratings are identified below:

> Proper Functioning Condition: Riparian / wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to:

- dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality;
- filter sediment, capture bedload, and aid in floodplain development;
- improve floodwater retention and ground water recharge;
- develop root masses that stabilize stream banks 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: Riparian / wetland areas that are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

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. (USDI 1993:10-11).

The Burns District has inventoried 385 miles of stream using the *Process for Assessing Proper Functioning Condition* (USDI 1993). Table 3-16 summarizes the results of those inventories.

Table 3-16. Proper Functioning Condition Assessment Summary

Rating / Trend	Miles	Percent
PFC	307	80
Functional at Risk / Upward	50	13
Functional at Risk / Non-Apparent	19	5
Functional at Risk / Downward	3	1
Non-Functioning	6	1
Total	385	100

Treatments Planned Relating to the Issues

Approximately 677 acres or 2.8 percent of the 24,233 acres of riparian areas and wetlands on the District are infested with documented invasive plants (Category 1)(see Table 3-17 and Map 3-5). Riparian vegetation and infested riparian vegetation were calculated using a 100-foot buffer on both sides of all perennial streams on the District.

Table 3-17. Category 1 Invasive Plants in Riparian and Wetlands

Species Group	Riparian Areas and Wetlands Infested				Average Size (Acres)
	Acres	Percent	Number of Sites	Size Range of Sites (Acres)	
Black henbane	0.015	0.000061	1	0.01	0.02
Bull thistle	216	0.89	85	0.001-120	2.5
Canada thistle	333	1.4	122	0.001-120	2.7
Dalmatian toadflax	14.7	0.06	25	0.001-5	1.3
Diffuse knapweed	4	0.016	10	0.001-5	0.4
Field bindweed	0.432	0.0017	1	0.1-1	0.4
Houndstongue	0.382	0.0015	6	0.001-1	0.003
Perennial pepperweed	41	0.16	7	0.001-30	5.9
Puncturevine	0.019	0.000078	1	0.1-1	0.02
Russian knapweed	1.1	0.004	7	0.001-1	0.16
Russian olive	1.6	0.006	1	1-5	1.6
Scotch thistle	25	0.103	42	0.001-5	0.6

Species Group	Riparian Areas and Wetlands Infested				Average Size (Acres)
	Acres	Percent	Number of Sites	Size Range of Sites (Acres)	
Spotted knapweed	0.401	0.0016	13	0.001-1	0.03
Whitetop	39	0.16	40	0.001-30	0.98
Yellow starthistle	1.3	0.005	1	1-5	0.6
Total	**677**	**2.8**	**362**	**0.001-120**	**1.9**

Herbicide treatments in riparian areas and wetlands for Category 1 invasive plants on the Burns District are generally small, with the exception of Canada and bull thistle (see Table 3-4, *Summary of Invasive Plants by Infestation Size*). Spot spraying would occur on most of these sites. Under the No Action Alternative the aquatic formulations of glyphosate and 2,4-D, as well as dicamba would be the most used herbicides. Chlorsulfuron and clopyralid would see more limited use. In the Proposed Action, the main herbicides would be chlorsulfuron and clopyralid, with the option of being able to use aquatic triclopyr, aquatic imazapyr, and metsulfuron methyl.

For Category 4 and 5, the Proposed Action envisions up to tens of thousands of additional acres treated per year, much of it likely aerially applied to sites infested with, or in danger of becoming infested with, invasive annual grasses. These treatments would generally be in larger units away from riparian areas and wetlands, and the preferred herbicide would be imazapic.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide-related effects to riparian resources is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures for Wetlands and Riparian Areas (see Appendix A). These include, but are not limited to:

- 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.
- Manage animals to prevent overgrazing and minimize damage to wetlands.

Under *Fish and Other Aquatic Resources* in Appendix A, a Standard Operating Procedure reads:

- Limit access of domestic animals to streams and other water bodies to minimize sediments entering water and potential for damage to fish habitat.

Environmental Consequences

Effects of Herbicides on Riparian and Wetland Areas

Herbicides used for Aquatic and Wetland Settings

Five herbicides proposed for use under the Proposed Action are registered for aquatic use by the EPA and approved for such use by the BLM nationally: 2,4- D (salt forms, not esters), fluridone, glyphosate, imazapyr, and triclopyr. Cautions for each herbicide vary in the aquatic environment. Table 3-18 summarizes the effects of each herbicide. Fluridone can only be used in an aquatic environment but the other four can be used in a riparian / ephemeral wetland as well. Fluridone would not be used in streams or water bodies with federally listed fish (see *Fish, Special Status Species and Other Aquatics* section).

Herbicides used in Riparian and Ephemeral Wetland Settings (non-aquatic)

Five additional herbicides proposed for use by the Proposed Action may be used in riparian areas and ephemeral wetlands or up to the water's edge: chlorsulfuron, clopyralid, dicamba, imazapic, and metsulfuron methyl. Table 3-18 summarizes the effects of these herbicides.

Herbicides Used For Terrestrial Vegetation Control

Four herbicides are strictly used for upland terrestrial vegetation control: diflufenzopyr, hexazinone, picloram, and sulfometuron methyl. Table 3-18 summarizes the effects of these herbicides. Standard Operating Procedures, Mitigation Measures, and product labels minimize the potential for actual adverse effects.

Table 3-18. Effects of Herbicides (Riparian and Wetlands)

Effects of Herbicides used for Aquatic and Wetland Settings	
Herbicides available under both alternatives	
2,4-D	The principle hazard is unintended spraying or drift to non-target plants; spot treatments applied according to the labeled rate do not substantially affect native aquatic vegetation or significantly change species' diversity (USDA 2005a, Washington Department of Ecology 2002). In aerobic riparian soils that have a high content of organic material, an active microbial community, high pH values, and high temperatures, toxic effects are limited because of rapid degradation of 2,4-D. 2,4-D may inhibit shoot and / or root growth of macrophytes in aquatic systems (Roshon et al. 1999). Only use approved formulations for streamside applications.
Glyphosate	Glyphosate is approved for emergent aquatic vegetation in wetlands and estuaries. It may move into surface water with eroded soil particles (although it is unlikely it would dislodge from the particles and become active) where it rapidly dissipates from surface water by biodegradation and adsorption. Freshwater aquatic macrophytes and algae are reported to be susceptible to low amounts (20 mg / l concentrations). For many years, glyphosate has been the most appropriate herbicide to use to control invasive plants in riparian areas. Only use approved aquatic formulations for aquatic applications.
Herbicides available under the Proposed Action	
Fluridone	Fluridone is a non-selective, slow-acting herbicide used in low concentrations to control submerged and emergent vegetation in ponds or reservoirs, lakes and canals where long-term contact with the target plants can be maintained to achieve control (not flowing waters). It photo-degrades, volatilizes slowly from water, and adsorbs to suspended solids and sediments. Currently there are no invasive aquatic plants on the District, but if it did become an issue, fluridone would be used where appropriate.
Imazapyr	Imazapyr is approved for wetlands and riparian areas. It is the most effective herbicide for Tamarisk and Russian olive, but it may also remove non-target vegetation. Residual soil contamination with imazapyr could be prolonged in some areas, possibly resulting in substantial inhibition of plant growth (SERA 2004d). Imazapyr is not likely to degrade in anaerobic soils or sediments, and has been shown to strongly bind to peat (American Cyanamid 1986, SERA 2004d). Aquatic applications (with approved products) can only be made within the restrictions outlined on the label.
Triclopyr	Triclopyr generally controls woody species in an upland environment but can be used in wetlands and riparian areas that go dry for part of the year. It can also be used for spot treatment of Canada thistle at low application rates, and perennial pepperweed in riparian areas, as it does not damage native grasses and sedges. Only the TEA (acid) form is approved for selective control of submersed aquatic vegetation. Triclopyr BEE (ester form) is hazardous to aquatic life forms in maximum concentrations or spill situations where runoff to open water may occur. Triclopyr BEE (ester form) should not be used where is could move into water.
Effects of Herbicides used in Riparian and Ephemeral Wetland Settings (non-aquatic)	
Herbicides available under the both alternatives	
Dicamba	Dicamba direct spray and drift scenarios pose a moderate to high risk to susceptible terrestrial plants. Susceptible aquatic algae are at high risk from an accidental spill scenario and from direct exposure at maximum rates. Tolerant (non-susceptible) algae are at low risk from accidental spill at maximum rate. In water, biodegradation is the major mechanism for dicamba degradation. Dicamba is mobile in soils and is therefore likely to reach surface water and groundwater. The rates of dicamba degradation were generally more rapid in the surface than in the subsurface soil microcosms. The study indicated that some riparian

	wetland soils possess limited potential to degrade dicamba (Pavel et al. 1999).
Herbicides available in limited areas under the No Action Alternative and District-wide under the Proposed Action	
Chlorsulfuron	Chlorsulfuron is effective at low concentrations and is prone to leaching. Hydrolysis rates are the fastest in acidic waters and are slower as the pH rises (Sarmah and Sabadie 2002). When hydrolysis rates drop, biodegradation becomes the primary loss mechanism. Strek (1998a, b) studied the dissipation of chlorsulfuron in an anaerobic sediment / water system; biodegradation progressed much more slowly than in aerobic soil systems, with a half-life greater than 365 days. Chlorsulfuron would not be applied to areas with standing or moving water, but would be applied to dry areas of the wetlands.
Clopyralid	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. Clopyralid is not likely to affect aquatic plants via off-site drift or surface runoff pathways unless spilled. Should not be applied where soils have a rapid to very rapid permeability close to aquifers.
Imazapic	Imazapic risk to aquatic plants from accidental spills 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, except when applied aerially at the maximum application rate with a buffer of 100 feet or less. Imazapic rapidly degrades through photo degradation in aquatic systems (SERA 2004c).
Herbicides available under the Proposed Action	
Metsulfuron methyl	Metsulfuron methyl poses a low risk to aquatic macrophytes from acute exposure at upper exposure limits (SERA 2004e). Metsulfuron methyl is stable to hydrolysis at neutral and alkaline pH. Larsen and Aamand (2001) evaluated biodegradation of metsulfuron methyl (25 µg / L) under anaerobic and aerobic conditions in sandy sediments; the herbicide did not biodegrade under any of these conditions. This herbicide is injurious to plants at extremely low concentrations. Non-target plants may be adversely affected from drift and run-off.
Effects of Herbicides used for Terrestrial Vegetation Control	
Herbicides available under the both alternatives	
Picloram	Picloram toxicity to aquatic plants varies substantially among different species. There is low risk to susceptible aquatic macrophytes from acute exposure to picloram at the maximum application rate. Because picloram does not bind strongly to soil particles and is not rapidly degraded in the environment, it has a high potential for being transported to wetland and riparian areas.
Herbicides available in limited areas under the No Action Alternative and District-wide under the Proposed Action	
Sulfometuron methyl	Sulfometuron methyl poses a high risk to aquatic plants from accidental direct spray and spills, and a high risk to susceptible and aquatic plants from drift. It poses a low risk to terrestrial plants from drift. Aquatic plants in standing water are typically at low to moderate risk for adverse effects from surface runoff scenarios. Sulfometuron methyl would not be applied during high winds, as drift could cause extensive damage to vegetation at a substantial distance from the application site. Do not apply directly to water or areas where surface water is present. Do not apply in or on irrigation ditches or canals, including their outer banks.
Herbicides available under the Proposed Action	
Diflufenzopyr	Diflufenzopyr is not approved for the treatment of aquatic plants, but poses a low risk to riparian species and aquatic plants via off-site drift.
Hexazinone	Hexazinone exposure poses a moderate to high risk for aquatic plants from acute and chronic exposures at both the typical and maximum application rates. Aquatic algal species are also susceptible to hexazinone exposure. It is also likely that aquatic macrophytes are susceptible, based on the effects of hexazinone on algae and terrestrial plants (SERA 1997).

Adverse Effects of Invasive Plants on Riparian and Wetlands

Native wetland and riparian species are adapted to the unique relationship of inundation of plants or soil by water for various portions of the year and respond well or survive such inundations. Invasive plants displace these native species, reducing habitat and stream bank stability. In addition, upland invasive plants spread into adjacent riparian areas where they compete with and displace the native species and can delay the recovery of riparian function.

Aquatic invasive plants can overwhelm water systems and displace native plants, removing habitat for native plant and animal species. Fish kills occur due to removal of too much oxygen from the water. Oxygen depletion occurs when plants die and decompose. Photosynthetic production of oxygen ceases, and the bacteria, which break down the plant material, use oxygen in their own respiration. Fish kills in summer are frequently caused by die-offs of algae blooms. Oxygen reduction from fall plant die-offs can be exacerbated by winter ice and snow cover, which blocks light, preventing native plant photosynthesis. Aquatic invasive plants can also:

- Interfere with or prohibit recreational activities such as swimming, fishing, and boating.
- Detract from the aesthetic appeal of a body of water.
- Stunt or interfere with balanced fish population.
- Produce quiet water areas that are ideal for mosquito breeding.
- Give water bad tastes and odors (certain algae species).
- Impede water flow in drainage ditches, irrigation canals, and culverts, causing water to back up.
- Deposition of invasive plants, sediment, and debris, can cause bodies of water to fill in (Lembi 2015).

Adverse Effects by Alternative

Common to Both Alternatives

Little to no targeted grazing is expected in riparian and wetland areas, but it could present an alternative to herbicide use. If targeted grazing occurred in riparian areas, trampling of wet soils and its resultant adverse effects on soils and water quality could occur. Standard Operating Procedures and standard targeted grazing monitoring would limit these effects. Soil and bank disturbance effects from manual, mechanical, and herbicide treatments could occur, but at a negligible level given the limited magnitude of the treatments.

Prescribed fire for invasive plant control would happen occasionally, and be limited to Category 1 invasive plants sites, which are seldom large (see Table 3-4, *Summary of Invasive Plants by Infestation Size*). Such treatments would primarily be outside of riparian areas, but burning could release ash and other nutrients that could blow or be washed to nearby riparian areas and wetlands. While these materials could potentially affect fish or water quality in large doses (see those sections in this Chapter), ash and nutrients released from prescribed burning would not be expected to noticeably adversely affect riparian area function because these materials are generally quickly utilized by the plants.

No Action Alternative

Of the four herbicides available under this alternative, approximately 80 percent of riparian and wetland treatments would occur using aquatic formulations of 2,4-D or glyphosate. 2, 4-D has moderate to high risks of negatively affecting non-target vegetation, and up to moderate risks for some Ecological Risk Assessment exposure scenarios for water quality, fish, and wildlife habitats. Glyphosate has moderate risks under several of the same scenarios (see respective resource sections in this Chapter). The rapid decay of these herbicides, particularly in wetland soils that have high organic matter, high pH, and slow or no water movement during application, limits the impacts to root tips and aquatic life forms that are found in this environment (Voth et al. 2006).

Proposed Action

The additional ten herbicides available under the Proposed Action would provide more opportunities to select herbicides least likely to affect riparian resources (see Table 2-10, *Treatment Key*, for more information). The additional herbicides would more effectively control infestations at a given site, slowing invasive plant spread, and decreasing the number of herbicide applications needed at that site. The majority of the invasive plants currently within 100 feet of perennial streams are Canada thistle (333 acres), bull thistle (216 acres), perennial pepperweed (41 acres), whitetop (39 acres), and Dalmatian toadflax (15 acres). The toadflax is primarily controlled with biocontrols (see Table 2-10, *Treatment Key*). The other four can be treated with aquatic glyphosate if the herbicide

might enter the water, but would be better controlled with mixes of chlorsulfuron, clopyralid, and / or 2,4-D. Glyphosate and 2,4-D are discussed under the No Action Alternative above. Chlorsulfuron could be applied away from water or in dry channels and wetlands. Risk Assessments show zero risk for fish and other life forms other than spills and direct applications to plants. Clopyralid is relatively non-toxic to aquatic plants, but accidental spill scenarios pose a low risk to fish at the typical and maximum rate, and a low to moderate risk to aquatic invertebrates at the typical and maximum rate respectively.

Beneficial Effects of Invasive Plant Control

For terrestrial invasive plants, the various levels of invasive plant control predicted to be achieved by each alternative would variously reduce or limit invasive plant-induced changes to wetland and riparian vegetation, soil water content, and erosion in wetlands and riparian areas adjacent to streams. Removing upland invasive plants would reduce the opportunities for spread into adjacent riparian areas where they would compete with and displace the native species. Native wetland and riparian species are adapted to the unique relationship of inundation of plants or soil by water for various portions of the year and respond well or survive such inundations. The native plant community would be better preserved, and the fauna that depends on it would benefit proportionately.

No Action Alternative

Control methods including the four herbicides available District-wide under this alternative would effectively control 12 of the 15 invasive plants documented in riparian areas on the Burns District (USDI 2010a:617-622, Table A9-2). The 26,000 acres of Category 1 invasive plants would be expected to continue spreading at about 12 percent per year, and infest 127,000 acres on the Burns District in 15 years (USDI 2010a:596). Since wetlands and riparian areas provide favorable invasive plant habitat, it is expected they would become similarly infested or worse.

Proposed Action

All 15 species currently found in riparian areas (see Table 3-18, *Effects of Herbicides*), as well as the other 10 species of Category 1 invasive plants found on the Burns District (see Table 2-1, *Summary of Documented Invasive Plant Sites*), could be effectively controlled with the tools and herbicides that would be available under the Proposed Action. Under this alternative, the projected noxious weed spread rate would be reduced to 7 percent in 15 years, reducing the projected 15-year infestation about 32 percent to 86,800 acres. Proportional benefits to riparian and wetland areas would be expected.

Cumulative Effects

Degradation of riparian and wetland areas and the values they support can be exacerbated by climate change, insecticide runoff, ammonia runoff from feedlots, fish diseases, livestock and wild horse grazing, juniper expansion, mining, and other factors. With increasing understanding of the value of the riparian, wetland, and water resources and the adoption of a standard inventory technique, evolving management strategies have been reducing those adverse effects to the extent practicable. These strategies have been successful as evidenced in improving trends in Proper Functioning Condition inventory results. Improved invasive plant controls, while potentially having short term localized negative effects, are more likely to improve riparian conditions over the long term as invasive plants are controlled and new infestations are prevented.

Fish, Special Status Species (Aquatic), and Other Aquatic Species

Issues

- How would the alternatives affect fish, amphibians, (including Special Status species) and their habitat, including water quality, macroinvertebrates, aquatic and riparian vegetation, and habitat complexity?

Affected Environment

The Burns District contains approximately 316 miles of perennial and intermittent streams, and 2,745 acres of reservoirs, ponds, and lakes, that provide habitat for fish.

Public land on the Burns District provides habitat for a total of 18 native fish species, distinct subspecies or distinct populations (see Table 3-19).

Table 3-19. Native Fish Species, Subspecies, and Populations

Common Name	Scientific Name	Status		
		BLM[1]	State[2]	Federal[3]
Lahontan cutthroat trout	*Oncorhynclus clarki henshawi*		T	T
Bull trout	*Salvelinus confluentus*		SC	T
Borax Lake chub	*Gila boraxobius*		E	E
Great basin redband trout[4] (Catlow)	*Oncorhynchus mykiss newberrii*	Sensitive	SC	S
Great basin redband trout[4] (Malheur Lakes)			SV	
Inland Columbia redband trout	*Oncorhynchus mykiss gairdneri*	Sensitive	SV	
Mountain whitefish	*Prosopium williamsoni*			
Malheur mottled sculpin	*Cottus bairdi ssp.*			
Tui chub	*Gila bicolor*			
Catlow tui chub	*Gila bicolor spp.*	Sensitive		S
Alvord chub	*Gila alvordensis*	Sensitive	SV	
Longnose dace	*Rhinichthys cataractae*			
Speckled dace	*Rhinichthys osculus*			
Northern pikeminnow	*Ptychocheilus oregonensis*			
Redside shiner	*Richardsonium balteatus*			
Largescale sucker	*Catostomus macrocheilus*			
Chiselmouth	*Acrocheilus alutaceus*			
Bridgelip sucker	*Catostomus columbianus*			

1. Draft Region 6 Regional Forester and OR / WA State Director Special Status Species List, December 18, 2014
2. State Status (ODFW): E-endangered; T-threatened; SC-Sensitive-Critical; SV-Sensitive-Vulnerable
3. Federal Status (U.S. Fish and Wildlife Service): E-endangered; T-threatened; S-Species of special concern with conservation agreements.
4. According to NatureServe, the Oregon portions of the Great Basin included Malheur Lake Basin. Two populations are listed here to show the different State listing status. These two are combined into one population for rest of this section.

A variety of nonnative fish species have been introduced to the District. The ODFW periodically stocks hatchery rainbow trout in Moon Reservoir, Chickahominy Reservoir, Poison Creek Reservoir, Frazier Seeding Reservoir, Grandad Reservoir, Green Spot Reservoir, Twin Springs Reservoir, Willow Reservoir, Stateline Reservoir, Cottonwood Reservoir, Warm Springs Reservoir, Fish Lake, Juniper Lake, Larkspur Reservoir, and Bigfoot Reservoir; and Lahontan cutthroat trout in Mann Lake. Currently, the ODFW does not stock any streams within the District. Brook trout, hatchery rainbow trout, and mixed-strain Lahontan cutthroat trout occur within the District from past stocking. Several other non-native fish (guppies and other aquarium fish, several types of sunfish) are commonly found in Great Basin aquatic systems and are the result of unauthorized introductions by private individuals.

The condition of fish populations is highly dependent on the quantity and quality of available habitat. The quality of available habitat is dependent on the integrity of the stream channel, floodplain, and adjacent riparian vegetation. Riparian vegetation moderates water temperature, adds structure to the banks to reduce erosion, and provides overhead cover for fish. Intact vegetated floodplains dissipate stream energy, store water for later release, and provide rearing areas for juvenile fish. Well-established riparian woodlands also supply woody debris to the stream channel, an important component in developing habitat complexity in stream channels (USDI 2005b).

Since riparian vegetation and fish habitat are ecologically interconnected, the condition of riparian habitat is an indicator of the condition of fish habitat. The majority of perennial and intermittent stream reaches on BLM-administered land on the Burns District have been evaluated to determine Proper Functioning Condition (PFC). See *Riparian and Wetlands* section for a complete discussion of PFC assessments and the status of streams on the Districts. PFC demonstrates the level of resilience required for system function that allows for maintenance and recovery of various values such (e.g., water quality and fish habitat) after disturbance. Eighty-two percent of fish bearing streams have been assessed for PFC. Sixty three percent of these were rated as PFC and contain the attributes necessary for riparian maintenance or recovery, while 11 percent were rated functional-at-risk with an upward trend, 4 percent were rated functional-at-risk, no apparent trend, 1 percent were rated functional-at-risk, downward trend and less than 1 percent were rated as non-functional .

Water quality parameters (especially factors such as temperature, sediment, and dissolved oxygen) are also important components of fish habitat. Several streams on the Burns District have been listed as water-quality limited for exceeding the temperature standard (See *Water Resources* section). Most of these streams contain Special Status fish species. Forty nine percent of fish bearing streams are water quality limited.

There are approximately 238 documented (Category 1) invasive sites totaling 587 acres, within 100 feet of fish bearing streams (see Table 3-20). The average size of infestation is approximately 2.47 acres.

Table 3-20. Category 1 Invasive Plants within 100 feet of Fish Bearing Streams

Invasive Plant	Current Infestation Acreage	Average infestation size
Bull thistle	181.74	2.98
Canada thistle	321.99	3.29
Dalmatian toadflax	6.87	0.33
Diffuse knapweed	3.68	0.74
Houndstongue	0.16	0.03
Perennial pepperweed	43.54	3.35
Purple loosestrife	0.0015	0.0007
Russian knapweed	0.19	0.063
Scotch thistle	2.71	0.27
Spotted knapweed	0.36	0.036
St. John’s wort	0.0001	0.0001
Tansy ragwort	0.0001	0.0001
Whitetop	26.00	3.25
Total	**587**	**2.47**

Special Status Species

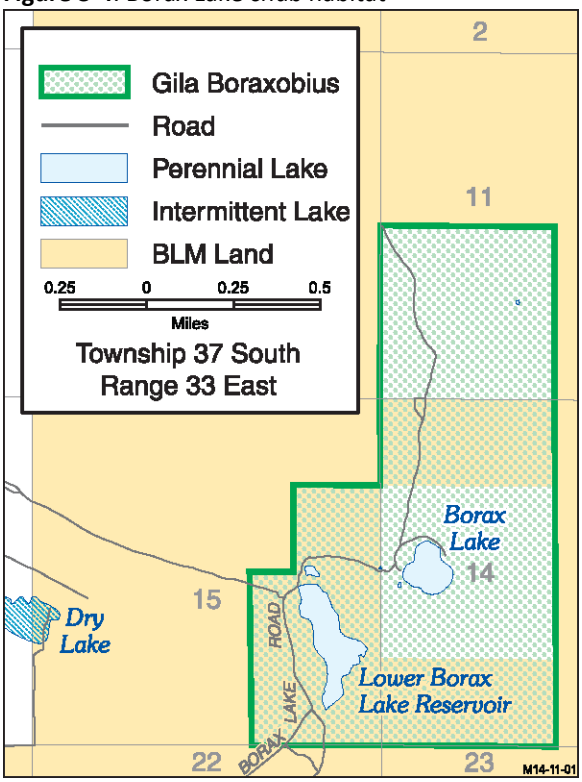
Three fish species found in the District are federally listed as threatened or endangered: Lahontan cutthroat trout, bull trout, and Borax Lake chub. There are 2.67 miles of critical habitat designated on the District for bull trout, 319.6 acres designated for Borax lake chub, and no designated critical habitat for the Lahontan cutthroat trout. Four fish species or subspecies are Bureau Sensitive: Alvord chub, Catlow tui chub, and the Great Basin and inland redband trout (see Table 3-19, *Native Fish Species, Subspecies, and Populations*). There are 3.34 acres of Category 1 invasive plants within 100 feet of federally listed fish bearing streams and 29.77 acres of Category 1 invasive plants within 1500 feet of federally listed fish bearing streams (see Table 3-21).

Table 3-21. Category 1 Invasive Plants within 100 feet of Federally Listed Fish Bearing Waterbodies

Fish	Category 1 Species	Number of Sites within 100ft buffer	Acres within 100ft buffer[1]
Lahontan cutthroat	bull thistle	2	0.08
	diffuse knapweed	2	3.02
	spotted knapweed	2	0.11
	Canada thistle	0	0
	Mediterranean sage	0	0
	Scotch thistle	0	0
	medusahead rye	0	0
Bull trout	bull thistle	3	0.14
	Canada thistle	0	0
Borax Lake chub	None	0	0
Total		**9**	**3.34**

1. Acres are also included in Table 3-20, *Category 1 Invasive Plants within 100 feet of Fish Bearing Streams*.

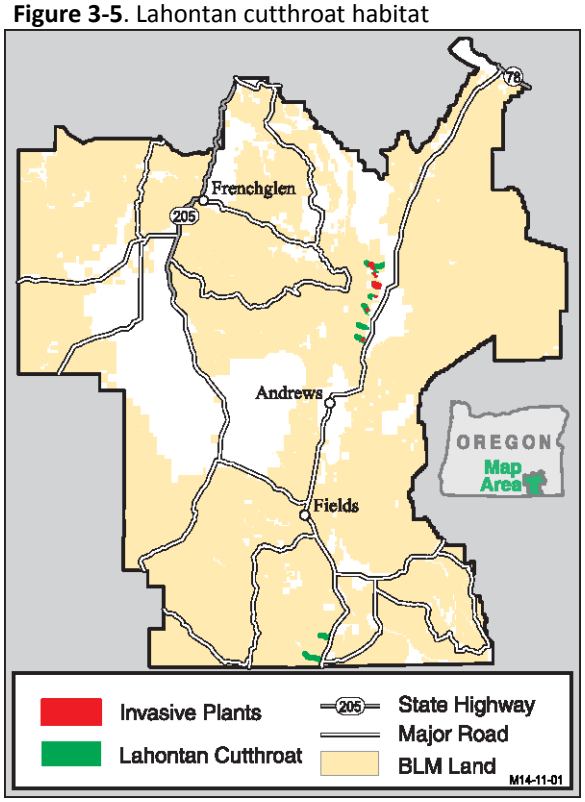
Figure 3-4. Borax Lake chub habitat



Borax Lake chub (federally listed – endangered)

The Borax Lake chub is found only in the Borax Lake ecosystem of Harney County, Oregon, a very unusual and fragile aquatic ecosystem of geothermal springs and mineral-rich waters (see Figure 3-4). The chub is federally listed as endangered. Threats include geothermal energy exploration and manipulation of surface water flows. The critical habitat includes Borax Lake, Lower Borax Lake, and associated ponds and marshes. Of the 640 acres of critical habitat, 320 acres are on BLM-administered lands and 320 acres are owned by the Nature Conservancy, including Borax Lake. The critical habitat is managed cooperatively under the Borax Lake Chub Recovery Plan (USDI 2005b). There are currently no known invasive plant infestations within or adjacent to the critical habitat.

Figure 3-5. Lahontan cutthroat habitat



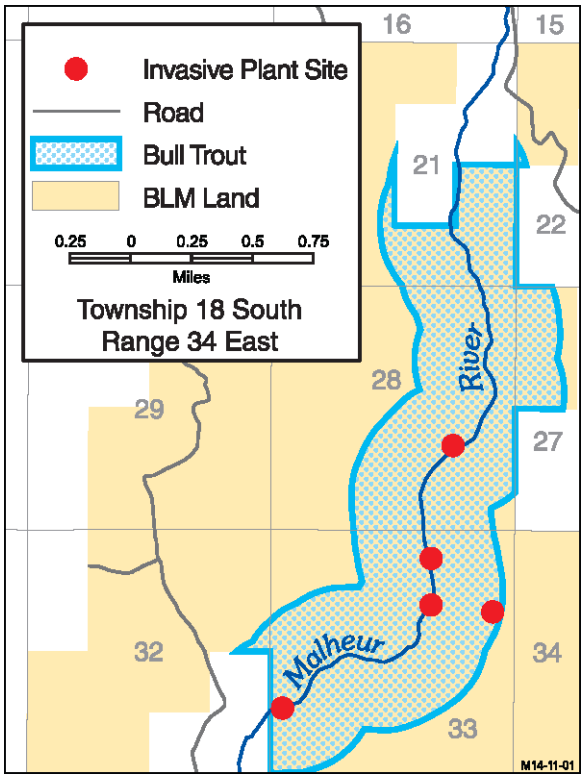
Lahontan cutthroat (federally listed – threatened)

The Lahontan cutthroat trout is native to southeastern Oregon (see Figure 3-5). It is federally listed as threatened. During the 1970s, Lahontan cutthroat trout were introduced from Willow and Whitehorse creeks into two creeks on the east side of the Pueblo Mountains and seven streams on the east side of the Steens Mountains. Lahontan cutthroat require cool water temperatures, deep water refuges and silt free gravels for spawning. Livestock grazing, loss of riparian habitat, and introduction of nonnative salmonids are key factors contributing to the decline of Lahontan cutthroat populations. The Lahontan cutthroat trout is found on approximately 14 miles of streams within the District (USDI 2005b). There are approximately 0.08 acres of Bull thistle, 3.02 acres of diffuse knapweed and 0.11 acres of spotted knapweed on BLM managed land within 100 feet of these streams. No critical habitat has been designated for the trout.

Bull trout (federally listed – threatened)

Bull trout are federally listed as threatened. Approximately 2.7 miles of public land on the Middle Fork Malheur River on the Burns District is identified by the U.S. Fish and Wildlife Service as bull trout migration, over-wintering and foraging habitat (USDI 2002) and has been designated as critical habitat (see Figure 3-6). Primary factors for the decline in the Middle Fork Malheur population of bull trout include dams, historic forest management practices, irrigation withdrawals, historic livestock grazing, past bull trout harvest, and introduction of nonnative species (USDI 2002). Currently the only known invasive plant adjacent to bull trout habitat on BLM managed land is 0.14 acre of bull thistle.

Figure 3-6. Bull trout habitat



Redband trout (Bureau Sensitive)

Great Basin and interior Columbia Redband trout are a subspecies of rainbow trout that are a BLM Sensitive Species. Redband trout occupy a wide array of habitats (Scott and Crossman 1973). Research suggests that redband trout are found in a wide range of conditions, often more extreme than those associated with other species. In the District, redband trout occupy 267.5 miles of stream habitat. Within 100 feet of these streams, there are 567.7 acres infested with Category 1 invasive plants on BLM managed land.

Six Great Basin populations, including the populations in the District, were petitioned for listing as threatened or endangered under the *Endangered Species Act* in 1997. The U.S. Fish and Wildlife Service determined that listing for these populations was not warranted (USDI 2000).

Alvord chub (Bureau Sensitive)

Alvord chub are a Bureau Sensitive species endemic to the Alvord Basin of southeastern Oregon and northwestern Nevada. It is a moderately sized minnow (less than 6 inches) that inhabits marshes, creeks, and springs with little or no current. Alvord chub appear capable of occupying a wide range of habitat conditions as long as relatively clean water persists that is free of introduced species. Introductions of nonnative fish and diversion of stream flows pose the greatest immediate risk to populations (USDI 2005b). There are approximately 15.78 acres of perennial pepperweed on BLM managed land within 100 feet of Alvord chub habitat.

Catlow tui chub (Bureau Sensitive)

The Catlow tui chub, a small to medium-sized minnow (less than 6 inches), is a subspecies of the more widespread tui chub. It is a BLM Sensitive species. Historically, Catlow tui chub occurred in three streams (Threemile, Skull, and Home Creeks) that drain the west flank of the Catlow Rim and in Rock Creek along the western edge of Catlow Valley (Kunkel 1976). The Catlow tui chub has a restricted range, but appears to be locally abundant in streams and in Threemile Reservoir. An exception is Rock Creek, where only a few were found in 1994. Diversions of creek flows for irrigation reduce Catlow tui chub habitat. Due to the restricted distribution of Catlow tui chub, disturbances such as drought, fire, and human land use practices place populations at risk. There are no known invasive plant infestations on BLM managed lands adjacent to Catlow tui chub habitat.

Columbia spotted frog (Federal candidate, Bureau Sensitive)

The Columbia spotted frog is divided into two different clades on the Burns District. This includes the Northern clade which is a Bureau Sensitive species and the Great Basin clade which is a Federal Candidate species for listing under the Endangered Species Act. Populations north of Harney and Malheur lakes are in the Northern clade while populations south of this area are considered part of the Great Basin clade. A clade has similar genetics to other clades, but has not reached the subspecies designation (same ancestry, different branch of the phylogeny). Columbia spotted frogs occupy 34 miles of streams on public lands in the District, typically slower moving waters within streams or streams where water is impounded by blocked culverts or beaver dams. Most of the streams in the District with suitable habitat have been inventoried. Columbia spotted frogs have not been located in any lakes or reservoirs on public lands, but not all have been inventoried. Fish Lake, a BLM-managed recreation area on State lands, contains Columbia spotted frogs in the lake and the springs that feed the lake. Columbia spotted frogs breed and lay egg clusters in emergent vegetation in slower moving waters. The eggs and tadpoles may be preyed on by fish and wading birds such as egrets. About 25 percent of the areas within 100 feet of occupied streams are infested with noxious weeds (roughly 208 acres), 99 percent of which are whitetop, Canada thistle, bull thistle, and perennial pepperweed.

Other Aquatic Species

Other aquatic species that occur on the Burns District include western toad, Great Basin spadefoot toad, western tree frog, long-toed salamander, numerous macroinvertebrate species, springsnails, and mussels. Macroinvertebrates are an indicator of water quality in stream systems and are a food source for many of the fish species found on the District.

Treatments Planned Related to the Issues

Approximately 587 acres within 100-feet of fish bearing streams on the Burns District are infested with Category 1 invasive plants. In addition, there are unknown quantities of Category 2 and 3 invasive plants that could also affect fish in the future. Primary treatment methods for each invasive plant species from Table 2-10, *Treatment Key*, are displayed in Table 3-22.

Table 3-22. Category 1 Invasive Plants within 100 feet of Fish Bearing Streams and Treatment Methods
Dark background indicates the primary treatment along fish bearing streams would be the same under either alternative. These include Special Status species.

Invasive Plant Species	Current Infestation Acreage	Percent of Total Riparian Area Infested	No Action Alternative: Primary Treatment Method[1]	Proposed Action: Primary Treatment Method[1]
Bull thistle	181.74	2.37%	2,4-D + dicamba, aquatic glyphosate[2]	Chlorsulfuron + clopyralid + 2, 4-D, aquatic glyphosate[2]
Canada thistle	321.99	4.20%	Biological control agents, aquatic glyphosate	Biological control agents, aquatic glyphosate, clopyralid
Dalmatian toadflax	6.87	0.090%	Biological control agents	Biological control agents
Diffuse knapweed	3.68	0.048%	Aquatic glyphosate, Biological control agents, manual control	Clopyralid + 2,4-D, aquatic glyphosate, biological control agents, manual control
Houndstongue	0.16	0.0021%	Aquatic glyphosate, manual control	Chlorsulfuron + 2,4-D, aquatic glyphosate or 2,4-D[2]
Perennial pepperweed	43.54	0.57%	Chlorsulfuron + 2,4-D, aquatic glyphosate or 2,4-D[2]	Chlorsulfuron + 2,4-D, aquatic glyphosate or 2,4-D[2]
Purple loosestrife	0.0015	0.000020%	Aquatic glyphosate	Aquatic triclopyr
Russian knapweed	0.19	0.0024%	Biological control agents, aquatic glyphosate	Biological control agents, aquatic glyphosate
Scotch thistle	2.71	0.035%	2,4-D + dicamba, aquatic glyphosate[2]	Chlorsulfuron + clopyralid + 2, 4-d, aquatic glyphosate[2]
Spotted knapweed	0.36	0.0046%	Aquatic glyphosate, biological control agents, manual control	Clopyralid + 2,4-D, aquatic glyphosate, biological control agents, manual control
St. John's wort	0.0001	0.0000013%	Biological control agents, aquatic glyphosate[2]	Biological control agents, metsulfuron methyl + 2,4-D, aquatic glyphosate[2]
Tansy ragwort	0.0001	0.0000013%	Manual control	Chlorsulfuron + 2,4-D
Whitetop	26.00	0.34%	Chlorsulfuron + 2,4-D, aquatic glyphosate or 2,4-D[2]	Chlorsulfuron + 2,4-D, aquatic glyphosate or 2,4-D[2]

1. Where treatments could contact water, specific formulations specified for aquatic use would be used.
2. Would be primary treatment when treatments could contact water

Both alternatives would also implement invasive plant control on some of these acres using additional herbicides as described in seven recent EAs (post-2010). Effects on these areas would be the same for both alternatives. In addition, the primary treatment on approximately 399 acres or 68 percent of the known invasive plant infestations adjacent to fish bearing streams would be the same under both the Proposed Action and No Action Alternatives.

For Category 4 and 5, the Proposed Action envisions up to tens of thousands of additional acres treated with imazapic each year, much of it likely aerially applied. These treatments would generally be in larger units away from streams, although aerial applications would have a higher likelihood of drift than the spot or boom treatments that would be prevalent under the No Action Alternative. In the case of Category 4, post-wildfire

emergency stabilization, treatments would have the objective of watershed protection as well as preventing erosion and infestation by annual grasses.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide related effects on fish and other aquatic resources is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include but are not limited to:

Chemical

- 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.
- Buffer intermittent stream channels when there is a prediction of rain (including thunderstorms) within 48 hours.
- Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments.
- Limit the use of terrestrial herbicides in watersheds with characteristics suitable for potential surface runoff that have fish-bearing streams during periods when fish are in life stages most sensitive to the herbicide(s) used.
- Use of adjuvants with limited toxicity and low volumes is recommended for applications near aquatic habitats.
- Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily.
- Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources.

Mechanical

- Maintain adequate vegetated buffer between treatment area and water body to reduce the potential for sediments and other pollutants to enter the water body.

Biological

- Manage animals to prevent overgrazing and minimize damage to sensitive areas.

Project Design Features Adopted for this Analysis

- For waterbodies that contain federally threatened or endangered fish species or provide critical habitat, all Project Design Criteria outlined in the Aquatic Restoration Biological Opinion II (ARBO II, USDI 2013c) from the U.S. Fish and Wildlife Service would be applied (see Appendix F). The herbicide buffer widths from that Appendix are displayed in Table 3-23 for reference.

Table 3-23. Federally Listed Fish: No-Application Buffer Widths for Herbicides
No-application buffer widths in feet for herbicide application, by stream types and application methods, for streams with federally listed fish (from ARBO II)

Herbicide	Perennial Streams and Wetlands, and Intermittent Streams and Roadside Ditches with flowing or standing water present			Dry Intermittent Streams, Dry Intermittent Wetlands, Dry Roadside Ditches		
	Broadcast Spraying	**Spot Spraying**	**Hand Selective**	**Broadcast Spraying**	**Spot Spraying**	**Hand Selective**
Labeled for Aquatic Use						
Aquatic glyphosate	100	waterline	waterline	50	0	0
Aquatic imazapyr	100	waterline	waterline	50	0	0
Aquatic triclopyr TEA	Not Allowed	15	waterline	Not Allowed	0	0
aquatic 2,4-D (amine)	100	waterline	waterline	50	0	0
Low Risk to Aquatic Organisms						
Dicamba	100	15	15	50	0	0
Dicamba + diflufenzopyr	100	15	15	50	0	0
Imazapic	100	15	bankfull elevation	50	0	0
Clopyralid	100	15	bankfull elevation	50	0	0
Metsulfuron methyl	100	15	bankfull elevation	50	0	0
Moderate Risk to Aquatic Organisms						
Imazapyr	100	50	bankfull elevation	50	15	bankfull elevation
Sulfometuron methyl	100	50	5	50	15	bankfull elevation
Chlorsulfuron	100	50	bankfull elevation	50	15	bankfull elevation
High Risk to Aquatic Organisms						
Triclopyr BEE	Not Allowed	150	150	Not Allowed	150	150
Picloram	100	50	50	100	50	50
2,4-D (ester)	100	50	50	100	50	50
Hexazinone	Not Allowed *(Not addressed in ARBO II)*					
Fluridone						

Environmental Consequences

Herbicide and Non-Herbicide Treatments

A summary of effects of specific herbicides to fish and aquatic resources is displayed in Table 3-24 below. These effects are generally summarized from the Risk Assessments and Tables (Appendix C), and are based on plausible exposure scenarios without the application of Standard Operating Procedures and other constraints. Standard Operating Procedures and Mitigation Measures including limitations on the herbicides, adjuvants, carriers, handling procedures, application methods, drift minimization measures, and riparian buffers greatly reduce the likelihood that significant amounts of herbicide would be transported to aquatic habitats, although some herbicides might enter streams through aerial drift, or in association with eroded or dissolved sediment in runoff including runoff from intermittent streams and ditches. No direct adverse effects to tolerant fish (non-susceptible, e.g. non-Bureau Sensitive) are anticipated (see Appendix C, *Herbicide Risk Assessment Summaries*).

Table 3-24. Effects of Treatment Methods (Fish and Other Aquatic Resources)

Herbicides available under both alternatives	
2,4-D	Over the range of 2,4-D acid / salt application rates used in U.S. Forest Service programs (0.5-4 lb. acid equivalent / acre), adverse effects on fish, amphibians, and aquatic invertebrates are likely only in the event of an accidental spill. With regard to 2,4-D esters, however, adverse effects on aquatic animals (e.g., fish, invertebrates, amphibians) are plausible in association with runoff (all application rates) and would be expected in direct spray to water and in cases of relatively large accidental spills (USDA 2006b). NMFS (2011a) determined that 2,4-D BEE posed a medium risk to fish. 2,4-D amine is labeled for aquatic use and 2,4-D ester is characterized as high risk to all federally listed fish due to the [narrow] proposed no-spray buffers (USDI 2013c).
Dicamba	The risk characterization for aquatic animals is extremely limited by the available toxicity data. Another very substantial limitation in the risk characterization is that no information is available on the chronic toxicity of dicamba to aquatic animals and the available acute toxicity data do not permit reasonable estimates of toxicity values for chronic toxicity. Acute toxicity studies in fish indicate that dicamba is relatively non-toxic, although salmonids appear to be more susceptible than other freshwater fish to the acute toxicity of dicamba (SERA 2004c). However, the EPA concluded that dicamba compounds with currently registered uses would have "no effect" on federally listed fish and their critical habitat, and therefore consultation with the National Marine Fisheries Service is not necessary (EPA 2003). Therefore, dicamba fits into the “low” risk group.
Glyphosate	Based on bioassays, technical grade glyphosate is classified as non-toxic to practically non-toxic in freshwater fishes (EPA 1993). Some formulations are more toxic to fish than technical grade glyphosate. At the typical application rate, the less toxic formulation of glyphosate poses little risk to fish, except under accidental spill scenarios, for which there is a low to moderate risk to fish. At the typical application rate, the more toxic (non-aquatic) formulation of glyphosate poses a high risk to fish under accidental spill scenarios, and a low risk under routine acute exposure scenarios (moderate risk to susceptible fish species). At the maximum application rate, the less toxic formulation of glyphosate poses a low risk to fish under acute exposure scenarios. Accidental spills for the maximum application rate pose moderate to high risk to fish. At this same application rate, the more toxic formulation of glyphosate poses a high risk to fish under accidental spill scenarios, and moderate risk to fish under acute exposure scenarios. Based on these data, the EPA classified glyphosate formulation as moderately toxic to practically non-toxic to freshwater fishes (SERA 2003a). Glyphosate hazard quotient exceedances occurred for fish and algae only at rainfall rates of 150 inches per year (over 15 times the average nine inches per year the District receives), and no hazard quotient exceedances occurred for aquatic invertebrates or aquatic macrophytes.
Picloram	The acute and chronic toxicity of picloram has been assayed in various species of fish. According to the Ecological Risk Assessments, risk to susceptible fish is moderate for accidental spill scenarios at the typical or the maximum application rate, and low for tolerant (non-susceptible) fish at the maximum rate. Under acute and chronic exposure scenarios, picloram poses no risk to fish (SERA 2011c). Based on expected concentrations of picloram in surface water, all central estimates of the hazard quotients are below the level of concern for fish, aquatic invertebrates, and aquatic plants. No risk characterization for aquatic-phase amphibians can be developed because no directly useful data are available. Upper bound hazard quotients exceed the level of concern for longer-term exposures in susceptible species of fish and peak exposures in susceptible species of algae. It does not seem likely that either of these hazard quotients would be associated with overt or readily observable effects in either fish or algal populations. In the event of an accidental spill, substantial mortality would be likely in susceptible species of fish (SERA 2011a).
Herbicides available in limited areas under the No Action Alternative and District-wide under the Proposed Action	
Chlorsulfuron	Chlorsulfuron is a selective, ALS-inhibitor herbicide. It is not registered for use in aquatic systems. This herbicide has a long half-life in ponds, but is not likely to bioaccumulate in aquatic wildlife. No evaluated scenario, including accidental direct spray and spill of chlorsulfuron, resulted in any risk to fish in streams and ponds.
Clopyralid	Clopyralid is not registered for aquatic vegetation treatment, but can be used in riparian areas if the application does not affect standing water. Application of clopyralid under the modeled scenario did not result in any hazard quotient exceedances for any of the species groups. Clopyralid applications were determined not likely to adversely affect federally listed salmonids or their habitat because hazard quotient

	values are less than one (USDI 2013c).
Imazapic	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). 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.
Sulfometuron methyl	Sulfometuron methyl has a relatively low residence time in aquatic systems, and bioaccumulation in aquatic organisms has not been detected (EPA 2009a). According to Ecological Risk Assessments, there would be no risks to fish associated with the use of sulfometuron methyl under any of the evaluated scenarios.
Herbicides available under the Proposed Action	
Dicamba + Diflufenzopyr	Diflufenzopyr + dicamba is a selective, systematic herbicide, with low residence times in water bodies and a low bio concentration potential (National Library of Medicine 2002). Diflufenzopyr + dicamba application does not pose a risk to fish under any application scenario (also see toxicity studies under dicamba and diflufenzopyr).
Diflufenzopyr	Diflufenzopyr is a selective, systematic post-emergence herbicide active ingredient. It is not registered for use in aquatic environments. The Ecological Risk Assessment shows that diflufenzopyr does not pose a risk to fish under any of the Risk Assessment scenarios.
Fluridone	Fluridone has little tendency to bioaccumulate in fish (Washington Department of Health 2000). An accidental spill of fluridone poses moderate risk to fish. Direct spray of fluridone over a pond at the maximum application rate poses a low risk to fish. Accidental direct spray of fluridone over a stream (aquatic herbicides are not typically applied to streams) at the maximum application rate poses no or low risk to fish. Because fluridone is an aquatic herbicide, off-site drift and surface runoff scenarios were not evaluated.
Hexazinone	According to Ecological Risk Assessments, there is a low risk to fish and other aquatic species in ponds or streams only for accidental spill scenarios, but otherwise has 0 risk (SERA 2005c).
Imazapyr	Imazapyr is relatively non-toxic to fish (SERA 2011b). Imazapyr poses a low risk to susceptible fish only for the accidental spill scenario at the maximum application rate. Tolerant (non-susceptible) fish were not modeled. ARBO II reported that no hazard quotient exceedances occurred for imazapyr for fish or aquatic invertebrates. Hazard quotient exceedances occurred for algae and aquatic macrophytes at a rainfall rate of 150 inches per year on low permeability clay soils (USDI 2013c). Algae and macrophytes provide food for aquatic macroinvertebrates, particularly those in the scraper feeding guild (Boulton 1993). These macroinvertebrates in turn provide food for rearing juvenile salmonids. However, the small amount of imazapyr that could reach the water from applications planned for the Resource Area should not result in measureable effects.
Metsulfuron methyl	Overall, metsulfuron methyl appears to have a very low potential to cause any adverse effects in aquatic animals. According to the Ecological Risk Assessments, metsulfuron methyl poses almost no risk to fish in streams and ponds under accidental, acute, and chronic exposure scenarios involving application of typical and maximum rates (although an accidental spill at the maximum application rate poses a low risk to susceptible fish species). No hazard quotient exceedances occurred for metsulfuron for fish, aquatic invertebrates, or algae. The hazard quotient exceedances for aquatic macrophytes occurred at the maximum application rate on clay soils at rainfall rates of 50 and 150 inches per year. Applications on the Burns District would not be exposed to such conditions.
Triclopyr	With the exception of aquatic plants, substantial risks to non-target species (including humans) associated with the contamination of surface water are low, relative to risks associated with contaminated vegetation. Applications of triclopyr BEE in excess of about 1.5 to 3 lbs. acid equivalent / acre could be associated with acute effects in susceptible species of fish or invertebrates, in cases of substantial drift or off-site transport of triclopyr via runoff (SERA 2011c). Stehr et al. (2009) observed no developmental effects at nominal concentrations of 10 mg / L or less for purified triclopyr alone or for the TEA formulations Garlon 3A and Renovate. However, the developmental toxicity of other triclopyr-containing herbicides, especially formulations based on BEE (e.g., Garlon 4), rewash were not determined. NMFS (2011a) determined that triclopyr BEE (esters) posed a medium risk to fish. However, given the uses, fate, and toxicity of triclopyr BEE, the National Marine Fisheries Service did not expect mortality to be a common occurrence. Triclopyr acid (TEA) posed a low risk only to susceptible fish under the accidental spill scenario at the maximum rate.

No adverse effects to fish are anticipated from biocontrols. Targeted grazing would be designed so as not to negatively affect fish habitat, and a Standard Operating Procedure requires ceasing before adverse effects occur. Therefore, no effects to fish or fish habitat are expected with this treatment.

Certain manual, mechanical treatments within riparian areas that disturb soil, such as grubbing and pulling, carried out over a large area, may lead to increased erosion and stream sedimentation. Resultant sedimentation may adversely affect fish by covering eggs or spawning gravels, reducing prey availability, or directly harming fish gills, reducing stream carrying capacity for fish. However, the risk of harm to aquatic ecosystems due to fine sediment production from manual treatment or use of motorized hand tools is low, and short-term, resulting in effects likely to be localized and minor. However, depending on the scale of treatment, pulling significant numbers of large plants or treating large riparian areas with motorized hand tools may moderately increase the risk to fish. Cut vegetation not in danger of contributing invasive plant seeds or sprouting matter to the site (including any cut non-target vegetation) left on the treatment site can reduce the potential for erosion and subsequent sediment delivery to streams or other water bodies.

The risk of harm to fish from use of wheeled or tracked machinery would vary, depending on the extent of treatment area and proximity to aquatic environments; vehicle tracks can compact soils and divert waters. Fish are temporarily affected when water is affected by turbidity, sedimentation, and local increases in surface water runoff. However, all wheeled equipment (including off-highway vehicles containing spray mix and other herbicide application equipment) would normally be kept well away from riparian areas to minimize aquatic effects and the risk of water-affecting spills. Some kinds of equipment, such as walking brush-cutters, are designed to minimize ground disturbance.

Power tool use near water can potentially cause water contamination with minor amounts of chainsaw oil or minor fuel spill. An oil skim on water, while highly unlikely, can deplete oxygen levels and cause fish kills. This effect is more likely for fish living in ponds than for fish living in rivers or streams, since the flow of water in streams would move and disperse small amounts of oil.

Mechanical or manual treatments would flush frogs into the deeper water where they would seek refuge until the disturbance is past.

The risk of harm to fish from prescribed fire for invasive plant control depends on fire intensity, timing, and landform, among other factors. Prescribed burning has the potential to bare large areas of soil, and thus increase both surface erosion and sedimentation of streams. Heavy runoff from burned areas can increase water pH, indirectly affecting aquatic biota. Site-specific implementation of Standard Operating Procedures would help prevent this method from being used where significant adverse stream effects would occur. However, both alternatives envision only occasional use of prescribed fire, and then only on Category 1-2 invasive plants. Only 36 Category 1 infestations on the District are larger than 100 acres (see Table 3-4, *Summary of Invasive Plants by Infestation Size*)

Adjuvants, Degradates, and Inert Ingredients

Adjuvants: The BLM reviewed toxicity data for adjuvants, such as surfactants and anti-foam agents, to assess risks to fish. In addition, the Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) model was used to evaluate the risks associated with polyoxyethylenamine (POEA), a surfactant found in some glyphosate formulations that is more toxic to fish than glyphosate itself. This adjuvant is of greatest concern in terms of potential effects to fish. Using the GLEAMS model, the BLM predicted the portion of an adjuvant that would potentially reach an adjacent water body via surface runoff.

Based on GLEAMS modeling for POEA, risks to aquatic organisms were not predicted for the majority of pond and stream scenarios involving exposure to this adjuvant. However, risks were predicted (using the most conservative

acute endangered species level of concern) for applications at a distance of 0 feet from the water body. This scenario, which essentially assumes a direct application to the water body with no dilution or drift, is highly conservative and highly unlikely under BLM application practices. Risks to federally listed and other Special Status aquatic organisms in streams and ponds were also predicted for aerial applications of POEA at the maximum rate at a distance of 100 feet from the water body. However, the BLM would not apply glyphosate formulations containing POEA in an area known to contain Special Status aquatic species; since the aquatic formulations the BLM uses near water do not contain POEA. Because of a lack of physical chemical property information, POEA was not modeled for leaching properties and runoff to water bodies. Therefore, there is some uncertainty associated with risk to fish from this exposure.

Some sources (Muller 1980, Lewis 1991, Dorn et al. 1997, Wong et al. 1997) generally suggest that the acute toxicity of surfactant and anti-foam agents to aquatic life ranges from 1 to 10 mg / L, and that chronic toxicity ranges as low as 0.1 mg / L. This evaluation indicates that, for herbicides with high application rates, adjuvants have the potential to cause acute, and potentially chronic, risk to aquatic species. More specific modeling and toxicity data would be necessary to define the level of uncertainty. Use of adjuvants with limited toxicity and low volumes near aquatic habitats would mitigate this risk. Wherever aquatic herbicides are required, adjuvants approved by ARBO II (for federally listed species habitats) would be used. BLM-approved adjuvants are included in Appendix B, Table B-3, *Adjuvants Approved for Use on BLM-Administered Lands* (USDI 2013c).

Degradates: Degradates may be more or less mobile and more or less toxic in the environment than their source herbicides (Battaglin et al. 2003). Differences in environmental behavior (e.g., mobility) and toxicity between parent herbicides and degradates makes prediction of potential impacts challenging. For example, a less toxic, but more mobile bioaccumulative or persistent degradate may have a greater adverse impact due to residual concentrations in the environment. The BLM conducted a detailed analysis of degradates for herbicides proposed for use under the herbicide treatment program. Several databases, including EPA's ECOTOX database (EPA 2009a), were searched, and relevant aquatic toxicity data for degradates were identified and considered in the Ecological Risk Assessments (see Appendix C, *Herbicide Risk Assessment Summaries*).

In most cases, predicted risks to fish from degradates would likely be less than risks from the active ingredients imazapyr and metsulfuron methyl predicted in Ecological Risk Assessments. For some degradates associated with 2,4-D, fluridone, and triclopyr, selected aquatic species may be more susceptible to the degradate than to the active ingredient. These findings would be considered in the context of herbicide use practices, the concentration of degradate relative to the parent compound, the process of degradate production, and the body of available toxicity data. For instance, in most cases, the increased toxicity of the degradate may be offset by the fact that only a minute amount of the degradate is produced, which would likely disperse rapidly in an active aquatic system.

Other Ingredients: Relatively little toxicity information was found on inert ingredients during preparation of the BLM Ecological Risk Assessments. A few acute studies on aquatic or terrestrial species were reported. No chronic data, no cumulative effects data, and almost no indirect effects data (food chain species) were found for the inerts in ten herbicides examined. However, some of the inerts, particularly the EPA List 3 compounds (inert ingredients of unknown toxicity) and unlisted compounds, may potentially be moderately to highly toxic to aquatic species (based on information in Material Safety Data Sheets or published data)(USDI 2010a:229).

Based on GLEAMS modeling of a generalized inert compound in a "base case" watershed, concentrations of inert ingredients exceeded concentrations of herbicide active ingredients under all stream and pond scenarios. In general, greater exposure concentrations of inerts occurred under higher application rates, exceeding 1 mg / L for the maximum pond application scenario. These results suggest that inerts associated with the application of herbicides may contribute to acute toxicity to fish if they reach the aquatic environment. However, given the lack of specific inert toxicity data, this statement may overestimate their potential toxicity. It is assumed that toxic inerts would not represent a substantial percentage of the herbicide, and that minimal impacts to the environment

would result from these inert ingredients. Standard Operating Procedures and Mitigation Measures would make adverse effects to fish negligible (USDI 2010a:229).

Adverse Effects by Alternative

Common to Both Alternatives

If invasive plants were to establish a secure positon in the plant community, the application of plant controls could result in short-term reduction of vegetative cover, soil disturbance, and degradation of water quality. In this case, sublethal adverse physiological effects to fish could occur. This is particularly true for herbicide applications in riparian areas or in ditches that may deliver herbicides to streams occupied by federally listed fish. These sublethal effects include increased respiration, reduced feeding success, and subtle behavioral changes that can result in predation. Changes to streamside vegetation would result in some reduction of terrestrial macroinvertebrates available to fish. This condition should ease over-time as native vegetation becomes reestablished on the affected sites (USDI 2013c). It is important to note that for the Category 1 invasive plants currently adjacent to fish bearing streams, the average size of infestation is very small (see Table 3-22, *Category 1 Invasive Plants within 100 feet of Fish Bearing Streams and Treatment Methods*, and Table 3-17, *Category 1 Invasive Plants in Riparian and Wetlands*). At this time, treatments along fish bearing streams would not be extensive since current infested areas are about 7 percent of the acreage within the 100 foot buffer. It is unlikely that small, spot treatments would result in changes to vegetative cover, soil disturbance, or water quality. The above-described effects would only be applicable under future scenarios if invasive plant treatments along fish bearing streams were to become more extensive.

For Columbia spotted frogs, the effects of treatments are likely similar to those for fish, as frogs spend most of their life in the water (they do go subterranean during the winter, when treatments are unlikely to happen). Tadpoles would be most susceptible until metamorphose, which generally occurs in August or September depending on elevation. Effects would be most likely March 1 to May 31 (breeding through early tadpole stage).

No Action Alternative

Herbicide Effects

Based on Forest Service Ecological Risk Assessments, chronic (long-term) and acute (short-term) exposures modeled for all herbicides in this alternative except acute exposure for glyphosate did not exceed the no observed effects concentration for any fish. For glyphosate, the Ecological Risk Assessment modeling predicted low to moderate risks from acute exposures at typical and maximum application rates. It is unlikely that the use of herbicides proposed in this alternative would cause fish kills at the concentrations likely to occur in water, even for federally listed fish. Mortality to fish is also not expected or likely from operational use, because Standard Operating Procedures, degradation, adsorption, and other factors reduce the amount of herbicide that could enter a water body. In rare circumstances, high concentrations of herbicides could wash into streams from rainfalls shortly after herbicide application along road ditches or other surfaces that rapidly generate overland flows, or because of an accidental spill. In such instances, localized fish kills are plausible in small tributary streams or small enclosed water bodies where contaminated flows would not be readily diluted. Dicamba presents a risk (low) only for susceptible fish under the accidental spill scenario at the maximum rate.

Invasive Plant Spread

Noxious weeds would be expected to continue spreading at about 12 percent per year on the District. Approximately 587 acres of riparian areas along fish bearing streams are currently infested with invasive plants. At the expected rate of spread, this would result in an additional 1,236 acres of invasive plants in 10 years. In addition, the inability to treat other non-noxious invasive plants with herbicides increases the likelihood additional

plants would become well established before they are declared noxious weeds. The spread of invasive plant populations at current rates would continue to cause damage to native plant communities, including riparian communities, which directly or indirectly provide habitat for fish.

Proposed Action

Of the ten herbicides added by this alternative, only triclopyr and fluridone show risks for operational exposure scenarios (exposures other than spills) at typical and maximum rates, even for susceptible (cold water) fish and aquatic invertebrates. Fluridone is not planned for use unless an aquatic invasive plant is discovered on the District,[57] and triclopyr is planned for use on 3 acres of Category 1 invasive plants, none of which are within 100 feet of fish-bearing streams. Based on planned use and the results of the Ecological Risk Assessments, it is unlikely the fish species would be harmed by herbicide use proposed in this alternative. Moderate to high risks can occur with triclopyr, and fluridone under accidental spill scenarios.

Each of the four currently available and ten additional herbicides that would be available under this alternative has different properties (e.g., mode of action), different suggested uses, and is most effective / least risky in different scenarios. This suggests that the more herbicides available for use, the more opportunities there would be to select one or more during project-level design that would present the least risk to fish while accomplishing the specific invasive plant control objective.

Although this alternative proposes to treat more acres than the No Action Alternative, much of this increase would occur in upland areas, generally away from streams. Under accidental direct spray, spill, and off-site drift scenarios modeled in the Ecological Risk Assessment, imazapic presents a very low or no risks to fish, similar to chlorsulfuron, and sulfometuron methyl but lower than the risks associated with other herbicides currently being used.

Fluridone is an aquatic herbicide that would be available under this alternative to control submerged aquatics including Eurasian watermilfoils and hydrilla if they were to be found on the District in the future. The fluridone Ecological Risk Assessment predicts no risk to fish from direct spray in a pond (fluridone is not used in streams). However, the Ecological Risk Assessment predicts risk to fish may occur when fluridone is spilled directly into a pond. Fluridone is slow acting and is used at low concentrations on both submergent and emergent plants. As the plants die off slowly, a large concentration of decaying organic matter is avoided so it is less likely to deoxygenate the water and kill fish than other aquatic herbicides. Fluridone would not be used in streams or water bodies with listed fish species.

Should an aquatic invasive plant invade the District in the future, it is very unlikely that implementation of aquatic vegetation control under this alternative would result in a fish-kill. Fish have avoidance mechanisms and are mobile allowing them to move to other parts of a lake or stream in order to avoid adverse conditions (such as a person doing manual or mechanical treatments, or applying herbicides). However, under certain circumstances such as an accidental spill in an enclosed water body or small fish-bearing stream, fish-kills could occur.

Invasive Plant Spread

Under this alternative, the invasive plant spread rate is projected to be reduced to 7 percent per year over the course of 15 years. Category 1 invasive plants are projected to infest 668 fewer acres of riparian zones adjacent to fish bearing streams than under the No Action Alternative. Although the Proposed Action would prevent more invasive plant infestations, their continued spread would continue to damage native plant communities, including riparian communities that directly or indirectly provide habitat for fish. This continued, albeit reduced, spread would still have harmful effects on fish habitat.

[57] Fluridone would not be used in streams or water bodies with listed fish species.

Beneficial Effects of Invasive Plant Control

The indirect effects or long-term beneficial effects of invasive plant control would depend on the long-term progression of climatic factors and the success of follow-up management actions to exclude invasive plants from the action area, provide early detection and rapid response before such species establish a secure position in the plant community, eradicate incipient populations, and control existing populations.

Riparian systems are being invaded by invasive plants, which are detrimental to native aquatic species. Potential adverse effects to aquatic species are also described in the *Water Resources* and *Riparian and Wetlands* sections in this Chapter. Invasive plants are generally less efficient at holding soil in place, and cause water-quality problems. Whenever the water quality of a fish-bearing stream is affected, so are fish. Specifically, fish are affected by turbidity, sedimentation, loss of large organic debris, loss of shading (and associated temperature increases), and exposure to hazardous substances. Erosion increases turbidity and sedimentation that can reduce fish feeding success. Severe cases of sedimentation can keep fry (early-stage fish) from emerging, or fill in or reduce the deeper pools preferred by fish, especially trout.

In riparian areas, invasive plants (e.g. Canada thistle, perennial pepperweed, etc.) often support fewer native insects than native plant species, which could affect food availability for insectivorous fish species, such as salmonids. The replacement of native riparian plant species with invasive plants may adversely affect stream morphology (including shading and instream habitat characteristics), bank erosion, and flow levels. Invasive plants break down the complex natural vegetative physical structure and interfere with natural processes. Imazapic, chlorsulfuron, clopyralid, and metsulfuron methyl would provide greater control of these species than the herbicides available under the No Action Alternative. These herbicides could be used to control perennial and biennial thistles, annual and perennial mustards, knapweeds, starthistle, and cheatgrass.

Problematic invasive plants that could be treated by the BLM using herbicides include water-thyme and Eurasian watermilfoils (although not currently documented in Burns District), which are found in ponds, lakes, and streams; and perennial pepperweed, knapweed, and thistles, which are found in riparian habitats. These species displace native vegetation and decrease species' diversity. Dense concentrations of aquatic plants can reduce light penetration and lower the concentration of dissolved oxygen in the water and can upset the balance of the fish community by providing too much cover for small fish (Payne and Copes 1986). Many invasive riparian plants form monocultures that crowd out more desirable native plant species.

Controlling invasive plants along fish bearing streams would alleviate these issues.

Cumulative Effects for Water Resources, Riparian and Wetlands, and Fish and Other Aquatic Resources

As noted above, removal of riparian vegetation and destabilization of stream banks causes stream degradation. Historic improper grazing is the land use most commonly associated with these problems on the Burns District. Other land uses associated with degraded streams include roads, trails, water withdrawal, reservoir storage and release, altered physical characteristics of the stream, mining, and wetlands alteration. Springs have also been disturbed by management activities, such as excessive livestock or wild horse grazing and watering, recreation use, and road construction. This affects the amount of water available. Juniper reduction projects (see Table 3-3.

Foreseeable Actions Potentially Relating to Cumulative Effects) benefit water-related resources in the mid and long-term by removing these unnaturally populous, high water-using trees.

Herbicide use also occurs on other Federal, State, and County lands, private forestry lands, rangeland, agricultural land, utility corridors, and road rights-of-way. The use of herbicides by BLM is usually a small amount of the total use in any large watershed given the mixed ownerships (See Table 3-2, *Pounds of Herbicides used in Oregon Closed Basins 2008, and BLM Current / Proposed Annual Use* and the *Neighboring Lands Pesticide Use* section early in this Chapter).

In 2000, the Oregon Department of Forestry completed a study of aerial pesticide applications, indicating that water resources, aquatic organisms, and riparian management areas were being adequately protected under current rules (which are less strenuous than the Standard Operating Procedures associated with this EA) (Dent and Robben 2000).

In addition, many of the proposed new herbicides pose fewer risks to riparian resources, wetlands, humans, fish, and wildlife than those available under the No Action Alternative. For example, the use of picloram, a particularly soluble, long-lived herbicide is estimated to decrease 55 percent under the Proposed Action (see Table 3-1, *Estimated Treatment Acres*). The contribution to downstream effects is minimized with Standard Operating Procedure implementation such as required buffer widths and limits on application methods. No adverse cumulative effects are expected.

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

Issues

- How would large-area treatments affect smaller resident species including insects, mammals, and reptiles?
- How would the alternatives affect locally important species such as mule deer, elk, pronghorn antelope, and bighorn sheep?
- How would the alternatives affect Special Status wildlife species including Greater sage-grouse?
- How would treatment disturbances (noise, presence of humans) and the timing of that disturbance affect migratory bird nesting and migration?
- How would the alternatives affect habitat quality (forage and cover availability / quality / quantity) over the short or long term?

Affected Environment

Numerous species of wildlife occur within the Burns District. The species and species groups discussed here specifically relate to the issues identified above.

Birds

Bald Eagle
The BLM manages the bald eagle as a Special Status species, and it is protected by the *Migratory Bird Treaty Act* of 1918, the *Lacey Act* of 1900, and the *Bald and Golden Eagle Protection Act* of 1940 (USDI 1940). Inventories of nesting bald eagles in the District have been conducted periodically over many years. Incidental sightings of bald

eagles during spring and summer have led to the discovery of two bald eagle nests on BLM-administered lands in the last five years. Inventories of wintering bald eagles, foraging areas, and communal night roosts have been conducted in Harney County by BLM, U.S. Forest Service, and Oregon Eagle Foundation biologists. Bald eagles forage in the winter on BLM-administered lands, U.S. Fish and Wildlife Service lands, and private lands throughout much of Harney County.

Golden Eagle
The golden eagle is a species of high public interest and is given consideration when planning resource activities. The golden eagle is not federally listed; however, it is protected under the *Migratory Bird Treaty Act* and the *Bald and Golden Eagle Protection Act* and is provided some of the same protections as a BLM Special Status species.

No systematic inventories have been completed for golden eagles in the District, but known nesting sites have been monitored at higher frequencies within the last 5 years. The BLM does not know all the golden eagle nest sites in the District, but the majority of the best habitats have been surveyed for nest sites.

Peregrine Falcon
The BLM manages the peregrine falcon as a Special Status species, and it is protected by the *Migratory Bird Treaty Act* of 1918 and the *Lacey Act* of 1900. The peregrine falcon was federally listed under the *Endangered Species Act* as endangered throughout its range and as a State endangered species under the *Oregon Endangered Species Act* (1987). The peregrine falcon was delisted in 1999 after reaching the recovery goals set forth in the 1982 Pacific Coast Recovery Plan for the American Peregrine Falcon.

Although peregrines have been documented on the District, recent inventories by Pagel (2001), Dust Devil, Inc. (2008), and Raven Research West (2009) revealed no active peregrine nests on BLM-administered lands in the District. It was determined that there was suitable habitat in many cliff areas around the District, especially near water sources such as Malheur National Wildlife Refuge, that would attract prey species for peregrines. Peregrines have historically nested south of Crane, OR and near Diamond Craters, but no nesting has been observed recently. Because there are no known peregrine nest sites on BLM-administered lands within the Burns District, peregrines will not be discussed further in the *Environmental Consequences* section.

Other Raptors
There are many other raptors on the District. These include, but are not limited to, osprey, northern harrier, sharp-shinned hawk, Cooper's hawk, northern goshawk, Swainson's hawk, red-tailed hawk, ferruginous hawk, rough-legged hawk, American kestrel, merlin, prairie falcon, barn owl, great horned owl, western burrowing owl, long-eared owl, short-eared owl, and turkey vulture. Some of these species are provided special management as BLM Special Status species, and three of these—the western burrowing owl, northern goshawk, and ferruginous hawk—are U.S. Fish and Wildlife Service species of concern and protected under the *Migratory Bird Treaty Act* of 1918.

Greater Sage-Grouse
On March 5, 2010, the U.S. Fish and Wildlife Service concluded that the Greater sage-grouse warrants protection under the *Endangered Species Act* through the Service's 12-month finding (USDI 2010c). However, the Service has determined that proposing the species for protection is precluded by the need to take action on other species facing more immediate and severe extinction threats. As a result, sage-grouse has been added to the list of species that are candidates for *Endangered Species Act* protection. The Service will review the status of the sage-grouse this year, to determine whether it warrants more immediate attention.

The Western Association of Fish and Wildlife Agencies published a conservation assessment for sage-grouse and sagebrush habitats in 2004 (Connelly et al. 2004). In 2011, a comprehensive summary of current science related to the sage-grouse and its habitats was published by the Cooper Ornithological Society (Knick and Connelly 2011). The Oregon Greater sage-grouse Conservation Assessment and Strategy (Strategy) was first adopted in 2005, then revised and adopted by the Oregon Fish and Wildlife Commission in April 2011 (ODFW 2011). The revised version

contains areas designated as *Core* and *Low Density* habitat with protection measures for each of these designations.

The Oregon BLM initiated a Resource Management Plan Amendment in an effort to incorporate sage-grouse conservation measures into its existing Resource Management Plans in eastern Oregon (USDI 2013d). This process is currently under way and is expected to be completed later this year. In the interim, until these sage-grouse plan amendments can be completed, the BLM follows the *Greater Sage-Grouse Interim Management Policies and Procedures (*USDI 2012a). The BLM has designated areas *Preliminary Priority Management Areas* (PPMA) and *Preliminary General Management Areas* (PGMA) similar to the ODFW Strategy Core and Low Density except that PGMA includes most areas that have the potential to support sagebrush on public lands. The Oregon BLM is committed to the conservation of sage-grouse and its habitats by using the applicable science and direction in all of the plans, policies, and procedures listed above.

Sage-grouse populations have exhibited long-term declines throughout their range (Connelly et al. 2004). Even in states where the species is considered secure, long-term population declines have averaged 30 percent (Crawford and Lutz 1985). In Harney County, sage-grouse depend on sagebrush / grassland communities. Populations have fluctuated since 1980; however, average populations estimates are roughly somewhere around 4,000 to 5,000 birds within the Burns District (ODFW 2011). Currently there are 975,712 acres of PPMA and 1,991,606 acres of PGMA on the Burns District.

Sage-grouse use strutting and mating grounds called leks. The leks are usually small open areas, from 0.25 acre to over 100 acres, with low sparse sagebrush or areas denuded of vegetation. Grassy swales, natural and irrigated meadows where grass has been removed, burned areas, cultivated fields adjacent to sagebrush-grass rangelands, and dry lakebeds are often used as leks. Most active leks have been included in the BLM's Preliminary Priority Management Areas.

Optimum sage-grouse nesting habitat consists of the following characteristics: sagebrush stands containing plants 16 to 32 inches in height with a canopy cover that ranges from 15 percent to 25 percent and an herbaceous understory of at least 15 percent cover that is at least 7 inches tall (Gregg et al. 1994). These conditions are usually found at a smaller patch sized scale and may not occur continuously across the landscape.

Early brood rearing generally occurs relatively close to nest sites, where chick diets include forbs and invertebrates (Gregg and Crawford 2009). Insects, especially ants and beetles, are an important component of early brood-rearing habitat. Brood habitats that provide a wide diversity of plant species tend to provide an equivalent diversity of insects, which are important chick foods (Gregg and Crawford 2009). As fall progresses toward winter, sage-grouse start to move toward their winter ranges, and their diet shifts to primarily sagebrush leaves and buds (Connelly et al. 2004).

The greatest negative impact on sage-grouse has been the destruction or adverse modification of their habitat, including invasion by invasive plants and wildfire. During the past 40 years, many sagebrush-covered ranges have been sprayed, plowed, chained, burned, disked, or cut in an attempt to convert these ranges to grasslands. Eradication of large tracts of sagebrush has occurred in Harney County over the last 50 years. In the last 30 years, most sagebrush loss has been due to wildfires, which have grown in size in the last 15 years. Of the 26,000 acres of Category 1 invasive plant sites on the District, almost all occur in either PPMA or PGMA.

Invasive annual grasses are threatening sage-grouse by outcompeting the native forbs and grasses needed to provide food and shelter for the species. The Preferred Alternative in the *Oregon Sub-Region Greater Sage-Grouse Final Resource Management Plan Amendment and Environmental Impact Statement* is expected to suggest reducing invasive annual grasses in PPMA to less than five percent cover. Currently, annual grasses have invaded known leks, nesting and brood-rearing habitat around the District. The northeast section of the District including the north end of the Steens Mountain and along the forest boundary north of Highway 20 are the main areas infested with medusahead rye.

Neotropical Migrant Bird Species
Numerous neotropical migratory bird species are found in the District, although no systematic nesting inventories have been conducted. Birds of Conservation Concern (USDI 2008b) that have been documented on the District include the white-headed woodpecker, Lewis' woodpecker, Williamson's sapsucker, pinyon jay, loggerhead shrike, green-tailed towhee, Brewer's sparrow, sage sparrow, black-chinned sparrow, and the sage thrasher. Neotropical migrant bird species are protected and managed under the *Migratory Bird Treaty Act* and the *Neotropical Migratory Bird Conservation Act* of 2000.

Mammals

Bats
Three Special Status bat species list are known to occur on the District. They include Townsend's big-eared bat, pallid bat, and spotted bat. Some bat surveys have been conducted across the District mainly in relation to abandoned mine closures. Several known roost sites have been documented for Townsend's big-eared bats. Pallid bats have been documented in a few sites within forested and semi-forested areas. Few records exist for spotted bats within the District.

Elk
Because the Rocky Mountain elk is a game species in Oregon, there is a high degree of public interest relative to the population levels and habitat condition. The elk is also valued by the public for wildlife viewing. Based on ODFW estimates, the present population of Rocky Mountain elk in the District and adjacent lands administered by the U.S. Forest Service are expanding toward the management objectives or goals of Oregon's Elk Management Plan (ODFW 2003b). On the BLM-administered lands in the District, habitat of primary concern is winter range. Summer and transitional range is mainly on U.S. Forest Service -administered lands; however, in the Steens Mountain and Stinkingwater Mountains, elk use on BLM-administered lands is year-round.

Approximately 580,000 acres of elk winter range have been identified on the Burns District. Of these acres, 8,568.5 acres are infested with the Category 1 invasive plants in 3,165 sites, which is 14.5 acres per site on average and about 1.5 percent of elk winter range. As with sage-grouse habitat, elk winter range is being affected by annual grasses across the District. Medusahead rye mainly affects winter range and spring range in the northeast section of the District, the north end of the Steens Mountain and along the forest boundary north of Highway 20. Elk may be a vector for spreading medusahead rye seed to the north onto the forest and south across Highway 20 on years when snow depth forces elk to lower elevations.

Mule Deer
Because the mule deer is a game mammal in Oregon, the public has a high level of interest in this species. In addition to interest in hunting, the public also values opportunities to view deer. Mule deer are one of the most numerous big game species in the District.

Approximately 1,132,000 acres of important deer winter range exists in the District. In general, higher elevations are used as summer ranges, and areas below 5,000 feet are considered winter range. Of these acres, 13,433.96 acres are infested with the Category 1 invasive plants in 2,061 sites, which is 6.5 acres per site on average and about 1.2 percent of deer winter range. Mule deer winter range and spring range is being affected by annual grasses across the District. Medusahead rye mainly infests winter range in the northeast section of the District including the north end of the Steens Mountain and along the forest boundary north of Highway 20. Deer may also be a vector for spreading medusahead rye seed to the north onto the forest and south across Highway 20 on years when snow depth forces elk to the south.

The winter range is primarily juniper woodland and sagebrush communities with interspersed grasses. Browse is the major component of the winter diet, primarily antelope bitterbrush, big sagebrush, curl-leaf mountain mahogany, and western juniper. Habitat conditions on winter ranges in the District vary considerably and are site

specific. It is generally recognized by wildlife biologists and range managers that it is extremely difficult to precisely measure habitat condition and productivity and even more difficult to relate these measures to herd parameters since survival of deer during the winter is more based on condition of the animals as they enter winter and the accumulation of snow which increases use of stored fat faster than during milder winters.

California Bighorn Sheep
California bighorn sheep occupy sagebrush-grassland habitat, which totals about 494,000 acres on the Burns District. Escape areas, lambing areas, thermal protection, rutting areas, and foraging areas are provided by the rugged mountains, canyons, and escarpments. Most water sources for bighorn sheep in this area consist of natural seeps and springs, waterholes and some big game guzzlers in the drier parts of the District. There are approximately 600 to 800 bighorn sheep currently on the District. California bighorn sheep numbers are managed in accordance with ODFW's December 2003 "Bighorn Sheep and Rocky Mountain Goat Management Plan." (ODFW 2003a) Of these acres, 2,475.64 acres are infested with Category 1 invasive plants in 424 sites, which is about 5.84 acres per site on average and about 0.5 percent of bighorn sheep range.

Pronghorn
Pronghorn are a very common big game species throughout the Burns District. The diet consists primarily of forbs and grasses during the spring and early summer. The rest of the year, pronghorn are primarily dependent upon low sagebrush and antelope bitterbrush. Seasonal movements are controlled primarily by snow depth, with deep snows hindering movement and covering the short brush. Pronghorn can be found at the highest elevations on the District during summer. Pronghorn winter range has not been delineated for the whole District so calculation of acres of invasive plant and invasive annual grass infestations is not available.

Other Small Resident Animal Species
Pygmy rabbits, a BLM Sensitive species, usually occur in dense stands of big sagebrush in deep loose soils; however, the rabbit's distribution and abundance is not fully known due to a lack of systematic surveys in the entire District. Systematic surveys have been completed on portions of the District since 2001 and have documented occurrence and density in suitable habitats.

Limited small mammal inventories conducted by the ODFW and BLM have documented white-tailed and black-tailed jackrabbits, cottontail rabbits, deer mice, kangaroo mice, kangaroo rats, northern grasshopper mice, Townsend's ground squirrels, least chipmunks, Preble's shrew, sagebrush voles, woodrats, white-tailed antelope squirrels, and many others within the District.

Other resident species including small birds also inhabit much of the District. No specific inventories have been conducted for these species; however, many are common and widely distributed.

Reptiles

Limited reptile surveys have been conducted in the District; however, northern sagebrush lizard, western fence lizard, desert horned lizard, short-horned lizard, western rattlesnake, garter snake, and gopher snake appear to be common in appropriate habitat types. Side-blotched lizard, long-nosed leopard lizard, desert whiptail, western skink, and striped whipsnake are known to occur in the District, but limited data are available on distribution and abundance of these species.

Invertebrates

Numerous species of terrestrial invertebrates inhabit the District. Many of these species are sedentary in nature and cannot move quickly if threatened. Only one Special Status species of insect is known to occur within the District: the Western bumblebee (*Bombus occidentalis*). No specific surveys have been conducted on the District

for other species (other than Special Status aquatics) that are suspected of being located or having suitable habitat on public lands. Invertebrate biodiversity and habitat relationships are poorly researched (King and Porter 2005).

Special Status Wildlife

Including some of the species described above, the Draft Oregon / Washington State Director Special Status Species List, December 18, 2014 lists 14 documented (including 2 listed) and 12 suspected Special Status wildlife species located on the Burns District (see Table 3-25).

Table 3-25. Special Status Wildlife

Type	Common Name	Scientific Name	Status	Documented or Suspected
Bird	yellow-billed cuckoo	*Coccyzus americanus*	Federally threatened	Suspected
Mammal	Canada lynx	*Lynx Canadensis*	Federally threatened	Suspected
Bird	Greater sage-grouse	*Centrocercus urophasianus*	Bureau Sensitive	Documented
Bird	western snowy plover	*Charadrius nivosus nivosus*	Bureau Sensitive	Documented
Bird	bobolink	*Dolichonyx oryzivorus*	Bureau Sensitive	Suspected
Bird	snowy egret	*Egretta thula*	Bureau Sensitive	Suspected
Bird	American peregrine falcon	*Falco peregrinus anatum*	Bureau Sensitive	Documented
Bird	bald eagle	*Haliaeetus leucocephalus*	Bureau Sensitive	Documented
Bird	Franklin's gull	*Larus pipixcan*	Bureau Sensitive	Suspected
Bird	black rosy finch	*Leucosticte atrata*	Bureau Sensitive	Documented
Bird	Lewis' woodpecker	*Melanerpes lewis*	Bureau Sensitive	Suspected
Bird	American white pelican	*Pelecanus erythrorhynchos*	Bureau Sensitive	Documented
Bird	white-headed woodpecker	*Picoides albolarvatus*	Bureau Sensitive	Documented
Mammal	pallid bat	*Antrozous pallidus*	Bureau Sensitive	Documented
Mammal	pygmy rabbit	*Brachylagus idahoensis* (Outside Columbia Basin)	Bureau Sensitive	Documented
Mammal	Townsend's big-eared bat	*Corynorhinus townsendii*	Bureau Sensitive	Documented
Mammal	spotted bat	*Euderma maculatum*	Bureau Sensitive	Documented
Mammal	wolverine	*Gulo gulo*	Bureau Sensitive	Documented
Mammal	fringed myotis	*Myotis thysanodes*	Bureau Sensitive	Suspected
Mammal	kit fox	*Vulpes macrotis*	Bureau Sensitive	Documented
Hymenoptera	western bumblebee	*Bombus occidentalis*	Bureau Sensitive	Documented

1. Columbia spotted frog is discussed in the *Fish, Special Status Species (Aquatic), and Other Aquatic Species* section.

Treatments Planned Related to the Issues

Common to Both Alternatives

Manual methods to control invasive plant infestations would be used very little in both alternatives (Tables 2-10 and 3-1). Targeted grazing with cattle would primarily be used for annual grass control. Targeted grazing with domestic sheep and goat would occasionally be used for Category 1 invasive plants where current interagency guidelines for separation from bighorn sheep can be met.[58] Prescribed fire may be used, on the order of a few times per decade.

Known infestations of invasive plants (Category 1) occupy 25,934 acres of Greater sage-grouse habitat within the Burns District. Additionally, control treatments would be conducted on invasive plants in mule deer winter range

[58] *Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat* (Wild Sheep Working Group 2012) Standards call for site-specific evaluations when domestic sheep and goats are proposed within 20 miles of wild sheep.

(13,434 acres) and elk winter range (8,569 acres), bighorn sheep habitats (2,476 acres), pronghorn and pygmy rabbit habitats over the next 10 to 15 years. The above acres overlap, so treatments that covered all the acres in sage-grouse habitat could also be in deer and elk winter range. The 26,000 acres of invasive plants are spread on 6,857individual sites, with 85 percent of these (and 1 percent of the acres) being sites less than 0.1 acre. Only 36 sites are larger than 100 acres, and eight are larger than 500 acres. All are planned for treatment.

The use of biological control agents for on certain invasive plant species would continue to be used under both alternatives.

No Action Alternative

Only the four chemicals 2,4-D, dicamba, glyphosate, and picloram would be used on noxious weeds District-wide, and chlorsulfuron, clopyralid, and imazapic would also be used for the control of Category 1 invasive plants and invasive annual grasses as described in the several NEPA documents recently approved and listed in Table 2-7, *Summary of NEPA Covering the No Action Alternative*. Current funding limits Category 1 treatments to about 3,000 acres per year, and invasive annual grass treatments are estimated to average 20,000 acres per year.

Proposed Action

Fourteen herbicides would be available District-wide. Category 1 invasive plant treatment acres would continue to rely on funding; however, it is desirable to treat more than the current 3,000 acres annually if possible. Invasive annual grass treatments are estimated to be up to 100,000 acres per year in Categories 4 and 5. One emphasis for these latter treatments: invasive annual grasses are threatening sage-grouse by outcompeting the native forbs and grasses needed to provide food and shelter for the species. The Preferred Alternative in the *Oregon Sub-Region Greater Sage-Grouse Final Resource Management Plan Amendment and Environmental Impact Statement* is expected to suggest reducing invasive annual grasses in PPMA to less than five percent cover. It is conceivable that some funding may be earmarked for this habitat work.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide-related wildlife health effects is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices Standard Operating Procedures and Mitigation Measures, Wildlife and Threatened and Endangered Species Sections*). These include, but are not limited to:

- 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 where feasible.
- To minimize risks to terrestrial wildlife, do not exceed the typical application rate for applications of dicamba, glyphosate, hexazinone, or triclopyr, where feasible.
- Minimize the size of application areas, where practical, when applying 2,4-D and Overdrive [dicamba + diflufenzopyr] to limit impacts to wildlife, particularly through contamination of food items.
- Where practical, limit glyphosate and hexazinone to spot applications in grazing land and wildlife habitat areas to avoid contamination of wildlife food items.

- 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, because either the treatment areas are large or the feeding area for an individual animal is small.
- 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.
- Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, susceptible life stages) for Special Status species in area to be treated.

Project Design Features Adopted for this Analysis

Where domestic sheep or goat grazing is proposed, follow *Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat* (Wild Sheep Working Group 2012) for determining appropriate separation. Standards call for site-specific evaluations when domestic sheep and goat use are proposed within 20 miles of wild sheep.

Environmental Consequences

Adverse Effects of Treatment Methods

All Treatments

Disturbance: Nesting and wintering bald eagle habitat is affected by human disturbance. Human activity can adversely affect the breeding, wintering, and foraging areas of bald eagles (USDI 1986). The major impacts to golden eagles or their habitat are disturbance near the nest during the nesting season and modification or destruction of the nest site itself. The major impacts to other raptors include disturbance or damage to nests and nesting structures as well as disturbances near the nest site during nesting seasons, which vary by species, but most nesting activity generally occurs between February 1 and August 31.

All treatment methods can cause disturbance, particularly those treatments using motorized equipment. Disturbance is the primary adverse effect of non-herbicide treatments. Manual methods (such as pulling, digging, and grubbing invasive plants) can cause disturbance and / or displacement when animals flee the area surrounding the treatment activities. Wildlife would likely not be displaced for long periods from manual treatments nor would manual treatments likely modify habitats to the extent that negative effects would occur from these treatment methods. Small mammals and migratory birds likely would be affected but the length of disturbance should not be long enough to cause abandonment of habitat.

Mechanical methods (such as weed whackers, chainsaws, and mowing) are used in limited circumstances and are used mainly in previously disturbed sites such as campgrounds and communication sites that may be avoided by wildlife when humans are present. Some wildlife would still be disturbed during these actions but would return to the sites when the disturbance ceased.

Non-Herbicide Treatments

Mechanical methods could cause loss of habitat so wildlife would move to other nearby similar habitats. Burrowing animals could be affected by mowing of vegetation, which could change structure and make them more exposed to predation. The use of targeted livestock grazing would affect wildlife and Special Status species use of the area during the treatment but is usually designed to avoid using needed habitats during breeding season or during growth periods of food species for certain wildlife and Special Status species.

Biological control agents, since they are host specific, would have little effect on wildlife or Special Status species. Disturbances associated with the release of agents into habitat would be negligible. The increase in insects on some of the target species could provide more food sources for migratory birds and sage-grouse if they are in the area of the release sites. This should not have any effect on the control agents in the long term but could provide a short-term source of protein for some wildlife species. Impacts from modification of habitats by biological control agents are unlikely because the agents target non-native invasive plants. There are rare examples of native species developing a dependence on invasive plants, but none are known on the Burns District.

Occasional use (once or twice a decade) of prescribed fires could occur for invasive plant control. The size of the area treated (less than 10 acres) would be negligible when compared to wildfires (average 3,501 acres) that are currently removing habitat for wildlife and Special Status species. Prescribed fires are timed to maximize kill of target plants while retaining desirable species, and would facilitate the long-term restoration of some areas that would have long-term benefits for wildlife and Special Status species.

Herbicide Treatments

Following (Table 3-26) is a summary of the potential risks to wildlife from each of the 14 herbicides considered in this analysis. This summary was adapted from the Oregon EIS and the Risk Assessments and risk ratings presented and described in Appendix C of this EA. Ratings are based on various plausible scenarios. Standard Operating Procedures and Mitigation Measures including limitation on the herbicides, handling procedures, application methods, drift minimization, and timing of application are designed to greatly reduce the likelihood that the modeled exposure scenarios would actually occur, and thus reduce the described adverse impacts to wildlife species, including Special Status species. However, some species, such as most of the invertebrates, are sedentary in nature and would be unable to escape or move to a new location away from treatment areas. In these cases, modeled exposure scenarios could potentially be attained.

Table 3-26. Effects of Herbicides (Wildlife)

Herbicides available under both alternatives	
2,4-D	2,4-D is a possible endocrine disrupter and is one of the more toxic herbicides for wildlife of the foliar-use herbicides considered in this EA. The ester form is more toxic to wildlife than the salt form. Ingestion of treated vegetation is a concern for mammals, particularly since 2,4-D can increase palatability of treated plants (USDA 2006a) for up to a month following treatment (Farm Service Genetics 2008). Mammals are more susceptible to toxic effects from 2,4-D, and the sub-lethal effects to pregnant mammals were noted at acute rates below LD_{50}. Birds are less susceptible to 2,4-D than mammals, and the greatest risk is ingestion of contaminated insects or plants. There is little information on reptile toxicity, although one study noted no sexual development abnormalities. No studies on invertebrates were found.
Dicamba	No adverse effects on mammals are plausible for either acute or chronic exposures of dicamba. At the highest tested rate, there are adverse reproductive effects possible for acute scenarios consuming contaminated vegetation. There is little basis for asserting that adverse effects in aquatic animals is plausible. Dicamba has no adverse effects on birds for acute or chronic exposures, although highest tested application rates had possible adverse reproductive concerns for acute scenarios involving birds consuming contaminated vegetation or contaminated insects (SERA 2004g). Dicamba is practically non-toxic to honeybees, but aquatic invertebrates appear to be slightly more susceptible to dicamba than fish or amphibians.
Glyphosate	Glyphosate is a low toxicity herbicide, widely used for terrestrial applications and is approved for aquatic use. Toxicity to most wildlife groups is very low, so much so that No Observed Adverse Effects Level levels are used because the LD_{50} were not found at high doses in many cases. Observed effects had to do with reduced feeding efficiency and reduced weight gain. Glyphosate adheres to soil, is degraded by soil bacteria, and does not bioaccumulate. Formulas vary in toxicity: 1) technical grade (pure) glyphosate is much less toxic than some of the commercial formulations; 2) commercial glyphosate formulations with the surfactant POEA are similar in toxicity to the surfactant POEA alone; 3) glyphosate herbicide formulations, such as Rodeo®, that are formulated without a surfactant are much less toxic than formulations with the surfactant POEA; and, 4) glyphosate herbicides with alternative surfactants would be much less toxic to frogs than Roundup Original / Vision® (Mann and Bidwell 1999, Perkins et al. 2000, Edginton et al. 2004a, Howe et al. 2004, all cited in Govindarajulu 2008, Relyea 2006). These studies support the conclusion that the toxic effect of POEA-

	containing glyphosate herbicides is due to POEA rather than to the active glyphosate ingredient. Ephemeral wetlands important to amphibians may not be protected by standard buffers (Govindarajulu 2008). There may be short-term adverse effects to terrestrial and aquatic amphibians where POEA formulations of glyphosate are used. Effects would vary by species and by developmental stage (Relyea 2005a (lethal impact), Relyea et al. 2005). Larval amphibians were more susceptible in some studies (Relyea 2005b), but less so in other studies (Thompson et al. 2004). Glyphosate has not been tested on a wide range of amphibians, nor does EPA require the testing of surfactants. Proprietary labels do not always identify the surfactants used. Pre-project clearance evaluations for Special Status amphibians would help project planners choose appropriate invasive plant treatments that have lower chance of adverse effects where these amphibians are likely to occur. In any event, a Mitigation Measure specifies avoiding using glyphosate formulations containing POEA, or seeking the use of formulations with the least amount of POEA, to reduce risks to amphibians (Appendix A, Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices Standard Operating Procedures and Mitigation Measures). Glyphosate is low risk to honeybees, but little information is available for other terrestrial invertebrates.
Picloram	Studies on birds, bees, and snails generally support picloram as relatively nontoxic to terrestrial animals. The few field studies indicated no change to mammal or avian diversity following picloram treatment. Variations in different exposure assessments have little impact to risk through ingestion, grooming or direct contact. Maximum rates have higher risk to mammals due to contaminated grass or insects. No information was found in the literature about picloram's effect on reptiles (SERA 2011c). No studies on invertebrates were found.
Herbicides available in limited areas under the No Action Alternative and District-wide under the Proposed Action	
Chlorsulfuron	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 levels of concern 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 (see Appendix C, *Herbicide Risk Assessment Summaries*). No studies on invertebrates, amphibians, or reptiles were found (SERA 2004a).
Clopyralid	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 no or low risk; mammalian chronic exposures are below the no observed adverse effects level at the typical rate. At the maximum rate, all but one risk scenario has no risk. 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 under the typical rate. No studies on reptiles or invertebrates were found (SERA 2004b).
Imazapic	Imazapic is an ALS-inhibitor that rapidly metabolizes and does not bioaccumulate. It is effective against medusahead rye, 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. No adverse short-term exposure risks to birds were noted for imazapic, but some chronic growth reduction was noted. None of the risk ratings for susceptible or non-susceptible shows any ratings that exceed the levels of concern. Imazapic is one of the lowest toxic risks to wildlife of herbicides evaluated in this EA along with other ALS-Inhibitors (SERA 2004c). No studies on invertebrates were found.
Sulfometuron methyl	Sulfometuron methyl is an ALS-inhibitor. Sulfometuron methyl could be used to control invasive plants in riparian areas when no water exposure is likely. It is highly toxic to aquatic plants. The Ecological Risk Assessments indicated no risks to aquatic invertebrates from any scenario. Sulfometuron methyl has the lowest risk to all groups of wildlife of the herbicides evaluated (with other ALS-inhibitors). The Ecological Risk Assessments indicated no risks to aquatic invertebrates.
Herbicides available under the Proposed Action	
Dicamba + Diflufenzopyr	Diflufenzopyr has slightly more toxic impacts to wildlife than dicamba based on evaluations in the Ecological Risk Assessment. The mixture has a moderate residual effect that could affect insects and mammals through ingestion but insect lethal effects are unlikely. It is practically non-toxic to aquatic invertebrates and has low toxicity to honeybees. Risk Quotients for terrestrial wildlife were all below the most conservative levels of concern of 0.1 (acute endangered species), indicating that accidental direct spray impacts are not likely to pose a risk to terrestrial animals. The mixture is practically non-toxic to birds, but there are some concerns for ingestion of contaminated thistle or knapweed manifesting in reproductive effects at high application rates. There are chronic and acute ingestion concerns for mammals as well (see Appendix C, *Herbicide Risk Assessment Summaries*). Aquatic invertebrates are more susceptible to dicamba than fish. One study on dicamba indicates it is practically non-toxic to amphibians (ENSR 2005d, i). Dicamba is practically non-toxic to

	honeybees, but aquatic invertebrates appear to be slightly more susceptible to dicamba than fish or amphibians.
Fluridone	Fluridone is used for submerged invasive plants that threaten aquatic wildlife such as watermilfoils. It has a low tendency to bioaccumulate (in fish). Fluridone exhibits low toxicity to most terrestrial mammals and small mammals may be more susceptible than large. Acute oral exposure of fluridone is practically non-toxic to birds. Fluridone is one of the aquatic herbicides with the highest risk factors; however, it has very low risk to other wildlife forms (see Appendix C, *Herbicide Risk Assessment Summaries*). Application timing could avoid most susceptible (water-associated) stages of amphibian development, if this information is available for resident herptiles at the treatment site (ENSR 2005g). No studies on invertebrates were found.
Hexazinone	The commercial formulas are less toxic than hexazinone by itself and the liquid form is more toxic than granular. For granular formulations, none of the hazard quotients for mammals exceeds a level of concern even at the highest application rate. For liquid formulations of hexazinone, hazard quotients exceed the level of concern at all application rates and all of the scenarios involving residue rates for contaminated vegetation or insects (Fletcher et al. 1994). Hexazinone and its degradates are persistent and highly mobile and hexazinone has been identified as a groundwater contaminate in some states. Bullfrogs were slightly more susceptible to behavioral change (diminished response to prodding) than leopard frogs over a 9-day study but amphibian studies were not adequate to determine the LD_{50}. Hexazinone poses zero to moderate risk to mammals for ingestion under both acute and chronic scenarios (see Appendix C, *Herbicide Risk Assessment Summaries*). Birds are more tolerant than mammals (SERA 2005c). No studies on invertebrates were found.
Imazapyr	Imazapyr is approved for aquatic use and is an ALS-inhibitor. There is a lack of information on dose levels that demonstrate harm to mammals, amphibians, or birds. Effects of field studies (Brooks et al. 1995) suggest observed changes to birds and mammals following treatment are habitat related, and not due to toxic effects. Imazapyr is one of the least toxic aquatic herbicides evaluated. Imazapyr is only slightly more toxic than the other ALS-inhibitors, all of which are the least toxic of any of the herbicides evaluated (SERA 2011b). No studies on invertebrates were found.
Metsulfuron methyl	Metsulfuron methyl is an ALS-inhibitor that does not appear to bioaccumulate. Metsulfuron methyl can be effective for invasive plants that are unsusceptible to other herbicides. None of the acute or chronic exposure scenarios exceeded the levels of concern at the typical rate, and few exceeded levels of concern at maximum rate. Metsulfuron methyl has very low toxicity to birds for direct spray and consumption; no mortality of acute spray on honeybees; and, aquatic invertebrates do not appear to be susceptible. One study on Rove beetle indicated reduced egg hatching. Daphnia are relatively tolerant. Like other ALS-inhibitors, it is one of the least toxic of herbicides evaluated (SERA 2004e). There is no mortality of acute spray on honeybees; and, aquatic invertebrates do not appear to be susceptible.
Triclopyr	Triclopyr is approved for aquatic use and can be used on saltcedar, watermilfoil, and purple loosestrife, all species known to adversely affect wildlife habitat. Triclopyr, as triethylamine (TEA) salt and butoxyethyl ester (BEE), is covered in the Ecological Risk Assessments. Some formulations of the TEA salt of triclopyr have been labeled for aquatic invasive plant control. Triclopyr TEA is less toxic to wildlife than triclopyr BEE. The major metabolite of triclopyr, 3,5,6-trichloro-2-pyridinol (TCP) is more toxic than triclopyr to mammals. At the upper range of exposures, hazard quotients for triclopyr exceed the levels of concern for mammals, but average hazard quotients do not exceed the levels of concern for any exposure scenario. Triclopyr is practically non-toxic to slightly toxic to birds at the typical rate. Consumption of treated vegetation (and insects) is the greatest concern for birds or mammals. Using less toxic formulas reduces risk (SERA 2011d). No studies on invertebrates were found.

Adverse Effects by Alternative

Common to Both Alternatives

The risk of adverse effects to wildlife from direct skin contact or ingestion would vary by the amount of herbicide placed on vegetation that is used as forage (which is affected by the extent and method of treatment), 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 generally would cause wild animals to flee. Some smaller less mobile resident species of wildlife unable to leave the treatment area could be directly sprayed or ingest sprayed vegetation. This could lead to negative effects to these individual animals.

As noted in the *Treatments Planned Relating to the Issues* section above, only 38 Category 1 invasive plant sites on the District are larger than 100 acres. Herbicide and even targeted grazing treatments in the invasive annual grasses, however, could cover several thousand contiguous acres, but such treatments would be in already compromised habitat and the treatment would be designed to rehabilitate these areas, improving sage-grouse habitat and big game winter range (see Map 3-7 for sage-grouse habitat and medusahead rye management blocks). Net effect for most species would be positive, particularly since imazapic shows no measureable toxicity to the full range of wildlife species. For Category 1-3 sites, spot treatments with any of about 12 herbicides might cover tens of acres but only individual plants would be treated. Boom sprays along roads and other areas would usually not cover more than dozens of acres at one location. Treatments would treat only the invasive plant portion of the vegetation or be on recently burned areas (e.g., aerially applied imazapic on burned areas to control invasive annual grasses). This would cause short-term disturbance but allow most wildlife species to shift their use of these habitats to other adjacent areas. Nesting birds and smaller less mobile resident species (e.g. mice, squirrels, rabbits) that are unable to shift their use to other areas could be negatively impacted. These impacts would be mitigated in part by the application of applicable Standard Operating Procedures and Mitigation Measures such as limiting timing of treatments, using selective herbicides, and reducing the concentrations of herbicides used. Standard Operating Procedures require any kind of treatments in known nesting areas for migratory birds and Special Status birds such as the Greater sage-grouse to be avoided during nesting season. Special Status species are subject to pre-project clearance surveys if occupancy of likely habitat is unknown and proposed treatments would cause negative effects. The locations of most sage-grouse leks are known.

The Burns District implements the recommendations for invasive plants as found in the Oregon Greater Sage-Grouse Strategy. Spraying would not be done near leks during breeding through brood rearing (March 1st -June 30th) and treatments in riparian areas during late brood rearing should try to avoid flushing sage-grouse since it makes them more vulnerable to predation by avian predators (ODFW 2011: 107-108).

Some wildlife species such as elk and occasionally pronghorns consume large quantities of grass and could potentially be at risk if broad-scale applications of selective herbicides were made on invasive plants over native grasses. One hundred percent grass grazing scenarios *were* specifically modeled in the Ecological Risk Assessments. However, few treatment areas are as large as 100 acres, and the likelihood of reaching Ecological Risk Assessment-identified risk levels would be low unless a new fawn or other factor kept the animals foraging within one of these treatment areas for an entire day or more.(USDI 2010a:269)

Manual and mechanical control treatments would occur on very small areas totaling about 15 acres per year, so disturbance effects from such treatments would be negligible. Similarly, biological control collecting and releasing would have little more effect than a passing hiker would.

Occasional use of prescribed fire as a tool for managing invasive plants has the potential to have localized short-term negative effects. However, this tool would generally be used in areas that were predominantly covered with invasive plants, or where native plants are dominant or otherwise not vulnerable (e.g. they are wet or dormant), and thus where little or no wildlife impacts would occur.

No Action Alternative

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 invasive grasses with glyphosate when they are 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 native or other desirable grass species without affecting the grass. Grazing of these sprayed grasses by wildlife could result in exposure (USDI 2010a:270).

The selected use of chlorsulfuron, clopyralid, and imazapic pose very low risk to wildlife but would not contain the spread of invasive plants and annual grasses in the long term leading to increased degradation of wildlife habitat.

Information on herbicides (see Table 3-26) available in this alternative show low risk/low toxicity to pollinators and pose little threat of adverse effects to overall population numbers from herbicide applications.

Specific 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 2010a:93). Further, for the reasons described above, the likelihood of an exposure leading to illness or death of wildlife other than the least mobile species is slight to non-existent.

Noxious weeds would be expected to continue spreading at about 12 percent per year on the District. Approximately 26,000acres are currently infested with invasive plants. At the expected rate of spread, this would result in 127,000 acres of invasive plants in 15 years (adapted from USDI 2010a:596), and these numbers do not include the invasive annual grasses. In addition, the inability to treat other non-noxious invasive plants with herbicides increases the likelihood additional plants would become well established before they are declared noxious weeds. The spread of invasive annual grasses would continue without effective controls,[59] changing and endangering (from fire) native sagebrush plant communities, including sage-grouse priority and general habitats as well as winter range for deer and elk and yearlong range for pronghorn and bighorn sheep. Smaller wildlife species might be locally absent or substantially reduced in larger infestations or larger areas of invasive annuals where native food sources are reduced or forced out.

Proposed Action

Impacts from the Proposed Action would be very similar to the impacts described in the No Action Alternative, except that ten additional herbicides could be used District-wide under the Proposed Action. Additional treatments would occur in areas with invasive annual grasses such as sage-grouse Preliminary Priority Management Areas, and as part of post fire emergency stabilization (Categories 5 and 4 respectively. See Map 3-7 at end of the Chapter).

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 invasive plants defenses such as toxins, spines, and / or distasteful compounds (DiTomaso et al. 2006). Nevertheless, some invasive plants (e.g. invasive annual grasses during the spring when they are green) would be utilized (grazed or browsed) by some wildlife species.

Under this alternative, use of the four herbicides available District-wide under the No Action Alternative would decrease, and herbicides generally less toxic to wildlife would be added (see Table 3-1, *Estimated Treatment Acres,* and Appendix C, *Herbicide Risk Assessments*). More than 80 percent of the projected herbicide use under this alternative would be with imazapic, an herbicide with very low measured risk to wildlife under any of the exposure scenarios. Most of the other use is with new herbicides including chlorsulfuron, fluridone, clopyralid, and sulfometuron methyl that have risk quotients that are all below the most conservative Levels of Concern, indicating that direct spray would not likely pose a risk. The herbicides imazapyr and metsulfuron methyl under typical application rates had no risk to wildlife predicted under any scenario (imazapyr is not registered for rangeland application and therefore it would be unlikely that wildlife would either eat contaminated vegetation or come in direct contact with it).

[59] Except in those areas with recent NEPA authorizing the use of imazapic and other herbicides effective on these grasses, see Table 2-7, *Summary of NEPA Covering the No Action Alternative*.

The increased number of herbicides available under this alternative would help lower risk to wildlife species because more choices would be available to meet site-specific concerns. As with the No Action Alternative, specific Standard Operating Procedures and Mitigation Measures would help prevent the risks described above (USDI 2010a:93). Further, for the reasons described, the likelihood of an exposure leading to illness or death of any but the most susceptible sedentary wildlife (such as a mollusk) is slight to non-existent. Effects at the population scale would be positive, as the benefits of controlling invasive plants would result in proportionately fewer degraded sites and better retention of native forage compared to the No Action Alternative. Information on herbicides available in this alternative show low risk/low toxicity to pollinators similar to but less than the No Action Alternative and pose little threat of adverse effects to overall population numbers from herbicide applications.

Beneficial Effects of Invasive Plant Control

Under this alternative, the noxious weed spread rate is projected to be reduced to 7 percent per year over the course of 15 years. The 26,000 Category 1 invasive plants are projected to spread to about 86,800 additional acres, which is a one-third (32 percent) reduction in the spread acres projected for the No Action Alternative. Actual spread of invasive plant may vary with funding levels and personnel availability, and with the condition of the existing 26,000 acres. Although the Proposed Action would prevent more invasive plant infestations, continued spread (at a reduced rate) would continue to degrade native plant communities and habitat for native wildlife species.

Having more herbicides available for control of invasive plants (including invasive annual grasses) would allow for more targeted treatment of infestations and allow for rehabilitation of infested sites to try to restore usable wildlife and Special Status species habitat. Restoration of invasive annual grass sites that increase the frequency and size of wildfires, and hence reduce functionality of wildlife habitat, would be more feasible than under the No Action Alternative. Restoration of functionality through increased deep-rooted perennial grasses and forbs with shrub cover would create more usable and productive habitats for wildlife.

Cumulative Effects

Common to Both Alternatives

Nesting and wintering bald eagle habitat is affected by human disturbance. Activities such as urban and recreational development, timber harvesting, mineral exploration and extraction, and all other forms of human activity adversely affect the breeding, wintering, and foraging areas of bald eagles by both the immediate action and cumulative long-term effects (USDI 1986). Other raptors can be similarly affected. Treatment crews can add to these disturbance effects, especially because many treatments must be conducted in the spring when invasive plants are in bloom and recognizable, and are best controlled if they are treated before they set seed.

Loss of native vegetation and declining ecosystem health on public lands due to global climate change, development including rights-of-way, increasing public use including the use of motorized equipment such as ATVs, and invasive plants all contribute to reductions in the ability of public lands to support healthy wildlife populations. The herbicide risk, and the disturbance and potential short-term localized loss of some forage or cover, can contribute to these pressures on wildlife, but the net effect of both alternatives is positive as they attempt to control invasive plants and restore native habitats. Other ongoing restoration and habitat improvement projects such as the removal of unnatural levels of western juniper also reduce the ongoing decline of native shrubs and grasses, thereby allowing more native grass and shrub habitats for a variety of wildlife species.

Livestock Grazing

Issues

- How would herbicide treatments affect livestock grazing on BLM allotments?
- How would the use of herbicides affect livestock and their forage?

Affected Environment

Livestock grazing is administered on 259 allotments covering roughly 96% of the Burns District. The whole District is open to grazing, except for areas within the Steens Wilderness, Diamond Craters and a few scattered exclosures for sensitive areas like Areas of Critical Environmental Concern and Research Natural Areas. Public land grazing on the Burns District is conducted in compliance with Grazing Administration regulations (43 CFR 4100). All the allotments are used by cattle and one is used by cattle and sheep.

The Burns District currently has two permittees with organic certification for beef production. The certified organic permittees on the Burns District have adopted different approaches to BLM's use of herbicides. Pastures must be herbicide free for three years to attain or maintain organic certification. One permittee has access to a large labor force and uses manual treatments to address invasive plants on BLM-administered lands. Another manages pasture use so the cattle avoid herbicide treatment areas

Resource area and District grazing decisions and allotment specific information is available in the Andrews / Steens and Three Rivers Resource Management Plans. There are 131 Section 3 (*Taylor Grazing Act*) grazing permits covering the 259 allotments. Total active preference is 160,255 animal unit months (AUMs).

Of the 170 high (I) and medium (M) priority allotments[60] on the Burns District, 130 have multiple pastures and allotment management plans (AMPs)(see Table 3-27). Most of these plans include deferred or rest rotation grazing systems in which pastures are not grazed at the same time year after year. Forty I and M allotments have one pasture and have less management flexibility. This is especially important during the spring when perennial bunchgrasses (the primary forage) are actively growing, and during the fall to ensure sufficient vegetation is present in riparian areas to dissipate energy and trap sediment throughout the winter. Multiple pastures and planned grazing allow flexibility to manage for multiple objectives such as season of use, riparian health, or vegetation management. Healthy, late successional native plant communities resist invasive plants better than earlier successional communities that have unoccupied niches.

Grazing animals tend to avoid many invasive plants because of low palatability or due to defenses such as toxins, spines, and / or distasteful compounds (DiTomaso et al. 2006). In addition, some invasive plants (e.g., poison hemlock and St. John's wort) are poisonous to cattle. Cattle readily eat cheatgrass other than during summer when it is unpalatable (the color red or with seeds). Medusahead rye appears less palatable than cheatgrass because it has coarser awns (a bristle-like appendage) and it concentrates silica, which is difficult to digest.

[60] I = High priority more intensive management due to important resource values or potential for improvement.
M = Medium priority allotment. Existing conditions are acceptable.
C = Low priority, often scattered BLM parcels with little potential for improvement or poor access.

Table 3-27. Allotment Management Categorization

Resource Area	Category	Number of Allotments	Acres	AUMs	AMPs
Andrews / Steens	I	29	1,412,824	98,916	23
	M	33	40,681	4,479	22
	C	6	44,358	6,838	6
	Closed to grazing		99,859		
Three Rivers	I	56	1,323,918	117,354	39
	M	52	302,160	39,124	46
	C	83	53,867	5,133	14
	Closed to grazing		26,327		
TOTAL		259	3,177,808	271,844	150

When given an option, cattle will always prefer grass to other forage material. They also select green forbs during the spring and antelope bitterbrush in the summer and fall. Sheep tend to optimize nutrients and balance intake to eat the most nutritious forage.

Treatments Planned Relating to the Issues

On the Burns District, cattle may be exposed to herbicide treatments from spring through fall.

No Action Alternative

The majority of treatments would involve spot or ground spraying many small Categories 1-3 infestations (see Table 3-4, *Summary of Invasive Plants by Infestation Size, 90 percent of infestations are less than 1 acre*). With the exception of limited areas where the use of imazapic has been approved, medusahead rye would not be addressed in a meaningful manner. For the 240,000 acres where medusahead rye could be treated (including aerial spraying)(see Table 2-7, *Summary of NEPA Covering the No Action Alternative*), treatments have been and would continue to be coordinated with the permittees. Possible grazing adjustments include changed pasture rotation schedule, rest, or moving cattle to untreated areas of a pasture.

In addition, using targeted grazing to help manage the invasive annual grasses would be efficient and economically efficient for the permittees involved.

Proposed Action

Generally small area[61] Category 1-3 treatments would continue at about a level similar to the No Action Alternative, although with a wider range of herbicides and likely (on average) with fewer treatments at an given site. With the addition of herbicides that could selectively treat invasive annual grasses (notably imazapic) large area aerial treatments would become more frequent. As much as 775,000 acres could be treated over the next 10-15 years. These treatments would require coordination with grazing permittees, but many allotments (150 out of 259) have grazing systems in place that would allow flexibility to manage around large herbicide treatments. In addition, medusahead rye and cheatgrass herbicide treatments would be done in the fall, and cattle would not be turned on that pasture until the next spring at the soonest. If treatment of invasive annual grasses requires reseeding,[62] livestock management to favor seeding success would be determined on a case-by-case basis.

In addition, using targeted grazing to help manage the invasive annual grasses would be efficient and economically efficient for the permittees involved.

[61] 88% of known sites on the Burns District are less the half an acre.
[62] Decisions about seeding are not a part of this EA and would be analyzed in project specific analyses.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide-related livestock health effects is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices, Livestock*). These include, but are not limited to:

- 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.
- 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.
- Do not apply 2,4-D, dicamba, Overdrive [dicamba + diflufenzopyr], picloram, or triclopyr across large application areas, where feasible, to limit impacts to livestock, particularly through contamination of food items.
- Where feasible, limit glyphosate and hexazinone to spot applications in rangeland.
- 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.

Environmental Consequences

There are adverse and beneficial impacts to livestock and livestock forage from the alternatives. While treatment activities are occurring, treatment activities could disturb livestock or they could eat treated forage. However, invasive plant treatments will improve rangeland health and the security of grazing permits may be greater.

Effects of Herbicides on Livestock

Potential impacts of herbicide to livestock could be affected by the amount of untreated forage available in the grazing area. Livestock prefer grasses and forage other than invasive plants, and within small treatment sites, untreated plants are readily available. Avoidance would be more difficult with large aerial treatments, but effects would be minimized by several factors. Imazapic, the herbicide most likely to be used on large areas of annual grasses, is not toxic to livestock at any rate of application, and carries no livestock use restrictions. Large aerial treatments are coordinated with the permittees, so they could take appropriate avoidance or management steps. Cattle also are startled by low flying airplanes or helicopters and are likely to move away from the treated area while treatments are occurring.

Herbicides that quickly damage or kill the plant, such as 2,4-D, are less likely to be eaten by livestock, because treated plants wilt and are no longer a preferred forage. Herbicides that easily move in water (whether surface flow or in saturated soils), such as picloram, could affect non-target plants outside the treatment site.

As shown in Table 3-28 under all planned treatment scenarios, the 14 herbicides available under the Proposed Action are relatively benign to large mammals. The receptor chosen for the large mammalian herbivore was a 154-pound deer. Cattle are larger and in general, the potential negative effects would be fewer due to their larger mass. See Appendix C, *Herbicide Risk Assessment Summaries,* for further information about the Ecological Risk Assessments including the risk quotients, levels of concern, and other Ecological Risk Assessment terms used below. The label restrictions on use around livestock for 2,4-D, picloram, and clopyralid are at least partially due to these herbicides passing through the digestive tract intact. As a result, urination or defecation on susceptible plants can kill that plant. 2,4-D and picloram are among the four currently authorized herbicides, and their use would decrease under the Proposed Action.[63]

Stated risks are for the exposure scenarios described in the Risk Assessments (see Appendix C, *Herbicide Risk Assessment Summaries*). As discussed under the *Effects by Alternative* section below, such exposures are limited by the Standard Operating Procedures and Mitigation Measures.

Table 3-28. Effects of Herbicides (Livestock)

Herbicides available under both alternatives	
2,4-D	2,4-D presents a low acute risk to livestock under the direct spray, ingestion, and spill scenarios, and a low chronic risk for large mammals for consumption of on-site contaminated vegetation under both typical and maximum rate, for both acid and ester formulations (SERA 2006). The Risk Assessment suggests that because large livestock eating large quantities of grass and other vegetation are at risk from routine exposure to 2,4-D and because 2,4-D is considered for use in rangeland, it should not be applied over large application areas where livestock would only consume contaminated food. According to label directions for one formulation, dairy animals should be kept out of areas treated with 2,4-D for seven days. Grass for hay should not be harvested for 30 days after treatment. Meat animals should be removed from treated areas three days prior to slaughter. Similar restrictions may be in place for other formulations.
Dicamba	The ingestion of food items contaminated by direct spray of dicamba at the typical and maximum application rate would pose a low and moderate acute risk to large mammalian herbivores respectively, and no chronic risk (SERA 2004g). Because dicamba is proposed for use in rangelands and forestlands and does have moderate residual activity, livestock may be at risk, particularly if it is sprayed throughout the range area. Based on label directions, there are no restrictions on livestock use of treated areas, other than for lactating animals.
Glyphosate	Glyphosate with POEA presents a low acute risk to livestock under the direct spray scenario at the maximum rate, and under the ingestion scenario at the typical and maximum rate (SERA 2011a). Glyphosate without POEA (e.g. aquatic formulations) present a low risk at maximum rate for consumption of contaminated grass (SERA 2011a). Ingestion of treated grasses could represent a risk, but glyphosate is non-selective and kills grass, suggesting that spot applications in rangeland would be the most appropriate use of this herbicide (although risk could occur if invasive grasses were treated when they were young and palatable). Spot applications would reduce risks associated with consumption of contaminated vegetation, as fewer non-target areas would be impacted by direct spray or spray drift. Based on label directions, there are no restrictions on livestock use of treated areas.
Picloram	Picloram poses a low to moderate risk for applications at the typical and maximum application rates for consumption of contaminated vegetation by a small animal, and low risk for consumption of contaminated vegetation by a large mammal at the maximum rate (SERA 2011c). Picloram is registered for use in rangeland, and can be applied over large areas heavily infested with invasive plants, as its primary targets are broadleaf and woody species. Therefore, it might be used to manage certain broadleaved plants without impacting native or other desirable grasses, but with the potential to expose livestock. Picloram has a number of restrictions on use in areas grazed by livestock or used for cutting hay. In general, livestock should not be grazed on treated areas, nor should hay be cut, for 2 weeks after treatment.

[63] Pounds of 2,4-D used District-wide would decrease by as much as 39 percent under the Proposed Action when compared to the No Action, although a similar number of acres would be treated under both alternatives. Use of picloram would reduce by 55 percent. See Tables 2-10 (*Treatment Key*) and 3-1 (*Estimated Treatment Acres*) for more information.

Herbicides available in limited areas under the No Action Alternative and District-wide under the Proposed Action	
Chlorsulfuron	Chlorsulfuron risk quotients for mammals for all modeled scenarios were below the conservative level of concern of 0.1, indicating that direct spray and ingestion of sprayed vegetation is not likely to pose a risk to livestock (Appendix C; ENSR 2005c). Based on label directions, there are no restrictions on livestock use of treated areas.
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 (SERA 2004b). All risks identified fall within the lowest risk rating; 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 seven days of grazing on untreated pasture.
Imazapic	Risk quotients for terrestrial animals were all below the most conservative levels of concern of 0.1, indicating that direct spray or drift of imazapic would be unlikely to pose a risk to livestock (Appendix C; ENSR 2005h). Based on label directions, there are no restrictions on livestock use of treated areas.
Sulfometuron methyl	This herbicide is relatively non-selective. It would be used on rights-of-way, but it is not registered for rangelands. The label has a one-year livestock re-entry restriction. Risk quotients for terrestrial animals were all below the most conservative levels of concern of 0.1, indicating that direct spray or drift of sulfometuron methyl would be unlikely to pose a risk to livestock (Appendix C)(ENSR 2005j).
Herbicides available under the Proposed Action	
Dicamba + Diflufenzopyr	Dicamba + diflufenzopyr poses a low chronic risk to large mammalian herbivores that consume plants contaminated by direct spray at the typical application rate and a moderate risk for ingestion scenarios involving direct spray at the maximum application rate (Appendix C; ENSR 2005i). Because it is proposed for use in rangelands and has moderate residual activity, livestock may be at risk from the application of this herbicide, particularly if it is sprayed throughout the range area. Based on label directions, there are no restrictions on livestock use of treated areas.
Fluridone	Risk quotients for large terrestrial animals were below the most conservative levels of concern of 0.1 for all scenarios (Appendix C; ENSR 2005g). These results indicate that accidental direct spray or drift of this aquatic herbicide would be unlikely to pose a risk to livestock.
Hexazinone	Applications of hexazinone at the typical and maximum application rates would pose a low acute risk to livestock under the direct spray, accidental spill, and ingestions of treated vegetation scenarios, and a low to moderate chronic risk to large mammals under the on-site consumption of contaminated vegetation scenario at typical and maximum rates respectively (SERA 1997). According to label directions, livestock should not be grazed, nor forage or hay cut, on treated areas for 60 days after application.
Imazapyr	Applications at the typical and maximum rate should not pose a risk to livestock (SERA 2011b). Imazapyr is not registered for use in rangelands; therefore, it is unlikely that impacts via direct spray or consumption of contaminated vegetation would occur. Based on label directions, there are no restrictions on livestock use of treated areas.
Metsulfuron methyl	Metsulfuron methyl applications at the typical application rate (0.03 lbs. / acre) should not pose a risk to livestock (SERA 2004e). Applications at the maximum application rate (0.15 lbs. / acre) pose a low acute risk to small animals under scenarios involving 100 percent absorption of direct spray and to large mammals under scenarios involving consumption of contaminated vegetation. However, a supplemental label restricts the application on rangelands to 0.0625 pounds of active ingredient per acre. Metsulfuron methyl is registered for use in rangeland, but impacts to livestock are unlikely if the typical application rate is used.
Triclopyr	Triclopyr presents low risk to livestock under the direct spray scenario at the maximum rate, and a moderate to high acute and chronic risk for consumption of contaminated vegetation at the typical and maximum rate respectively (SERA 2011d). Triclopyr can be used in rangelands to selectively manage woody species without impacting native or other desirable grasses, so broadcast treatments could create exposure scenarios if livestock are not removed or the treatment area is not limited in scope. There are few grazing restrictions for triclopyr, except for lactating dairy cattle. Hay should not be harvested within 14 days of application. Although cattle can graze at any time, they would be removed from treated areas at least three days prior to slaughter.

Effects by Alternative

The potential differences between the alternatives relative to livestock management largely arise from the increased possibility for large area treatments of medusahead rye and cheatgrass under the Proposed Action. The potential impacts to livestock forage are similar to the impacts to native vegetation. Rangeland health and plant community successional trajectory towards late seral plant communities would improve over the long term. Because the Proposed Action includes more effective and more selective herbicides, it would be expected to better achieve these goals.

Impacts to organic beef producers do not vary by alternative. The District would continue to coordinate with these permittees on a case-by-case basis to avoid jeopardizing their organic certification.

No Action Alternative

Although not as effective at treating invasive plants as the Proposed Action, working under the No Action Alternative has resulted in 81 percent of the Category 1 invasive plant sites on the District being smaller than 0.1 acre (see Table 3-4, Summary of Invasive Plants by Infestation Size). Because ample forage is generally present on all the allotments and because recovery of more functional native plant communities would be slow, the No Action Alternative for species other than medusahead rye would have little effect on livestock or their management.

The four herbicides available District-wide under this alternative are not very effective against perennial pepperweed, Canada thistle, Russian knapweed or other knapweeds. Retreatments are frequently needed to contain populations and prevent seed set. These additional treatments can result in additional exposure to livestock when compared to the Proposed Action.

As discussed under Effects of Herbicides on Livestock above, 2,4-D and picloram can pass through the livestock digestive tract intact. The labels include directions to delay livestock turnout onto susceptible crops. This delay can occasionally be a management issue for permittees. There are two recommended treatment windows to treat knapweeds or Canada thistle: 1) in the spring when rosettes are vulnerable and seed production can be prevented and 2) in the fall after the first frost to maximize herbicide translocation. It is possible that it could be time to move the cattle off the BLM allotment and potentially on to private alfalfa fields before the 30 day (for 2,4-D) or two week period (for picloram) has passed. Coordination and management can minimize the potential for this risk.

The four herbicides have zero to low levels of risk in large herbivore tests at typical rates and zero to moderate levels of risk at maximum rates (see Appendix C). Chronic exposure to dicamba and glyphosate at both application rates, and picloram at the typical application rate, were zero or not evaluated. Acute exposure to 2,4-D (typical and maximum rate), dicamba (typical rate), and glyphosate (typical and maximum rate) resulted in a low risk. Acute exposure to picloram resulted in zero risk at both typical and maximum rates. Acute exposure to dicamba at the maximum rate would be moderate. Dicamba, 2,4-D, and picloram are all used to treat broadleaf plants and forbs, and cattle generally prefer grass. Glyphosate is non-selective and is used only for spot treatments. While there is a potential for an adverse effect from drift onto non-target grasses, it is unlikely that this would happen often enough that livestock would consume it for an entire day. For these reasons, the potential effects to livestock would be slight to none.

Invasive annual grasses cannot be selectively treated under this alternative except in areas with recent NEPA approval (see Table 2-7, Summary of NEPA Covering the No Action Alternative). In those areas, large-scale aerial herbicide treatments of medusahead rye with imazapic occur in the early fall. Thus far, those applications have been conducted when livestock were not grazing in those areas, so livestock were not exposed and management did not have to be changed. However, if this is the turn out pasture the next spring they could be exposed to imazapic. The level of possible exposure in the spring following a fall treatment appears to be variable and small. Imazapic was not toxic to large mammals under any of the test scenarios. The Risk Assessment (ENSR 2005h) found that even at maximum allowed application rates of imazapic, direct consumption of sprayed forages was not toxic

to large mammals. In addition, while imazapic can have a two year residual effect in the soil, it weathers and washes off sprayed plants.

An acre dominated by medusahead rye and cheatgrass can provide more forage for a cow than an acre in a late seral stage dominated by shrubs. However, this situation does not meet BLM's multiple use land management objectives, and, while cattle willingly eat cheatgrass and can be managed to eat medusahead rye from fall through spring, invasive annual grasses are not a dependable source of forage and annual production can vary greatly from year to year depending on weather conditions. In addition, dominance by invasive annual grasses leads to more frequent, intense wildfires, reducing natural and introduced forage plants (Whisenant 1990). When forage is unexpectedly unavailable, the permittee is forced to find other forage with little warning. It is expected that for infested parts of the District this alternative would result in a slow decrease in livestock carrying capacity as increasingly frequent wildfires decrease or eliminate many of the resource values associated with the native plant community.

Proposed Action

Under the Proposed Action less dicamba, glyphosate, and picloram would be used, because herbicides that are more effective would become available (see Table 3-1, *Estimated Treatment Acres*). Therefore, livestock would have less exposure under the Proposed Action. The District would continue to use 2,4-D in combination with other herbicides, so its use would decline only slightly.

The following herbicides at acute and chronic exposure and typical and maximum application rates were zero risk for large mammals: chlorsulfuron, fluridone, sulfometuron methyl, imazapic, imazapyr, clopyralid, hexazinone, and diflufenzopyr. There are no potential effects to cattle under the operational (non-spill) scenarios or normal uses on the Burns District. The risks from the four herbicides currently in use would be the same as described under the No Action Alternative, but number of acres treated with those herbicides would decrease, and hence the chance for adverse effects would be reduced.

Triclopyr had moderate to high risk to large mammals under the scenarios tested. Under the Proposed Action, triclopyr is identified for three acres of Category 1 invasive plants; it may be used to treat aquatic invasive plants, purple loosestrife growing in water, or as a "cut stump" treatment for tamarisk and Russian olive. None of these situations result in much risk of drift to, or accidental treatment of, livestock forage. A Standard Operating Procedure states, "whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area." While the risk from triclopyr is moderate to high for large mammals, the factors presented above mean there is little chance of a toxic cattle exposure from treatments on the Burns District.

Sulfometuron methyl has a one year livestock use restriction. Since sulfometuron methyl is not labeled for rangelands, there is little potential this herbicide would be used on BLM allotments.

The availability of herbicides more effective against a wider range of invasive plants in all Categories could reduce the number of treatments needed to eliminate an infestation, which would reduce the amount of time spray crews disturb cattle that may be using an infested area.

Due to the narrow treatment window and constraints of contracting, coordination of large-scale aerial invasive annual grass treatments with effected permittees is especially important. . Advance communication with the permittee would be needed to ensure they are in agreement with the project and have the flexibility to manage the livestock to accommodate the treatment schedule. However, medusahead rye and cheatgrass herbicide treatments would be done in the fall, and cattle would not be turned on that pasture until the next spring at the soonest. This means that for most allotments the normal livestock management already avoids most immediate and indirect potential herbicide effects to cattle.

Targeted grazing to help control the invasive annual grasses would benefit permittees in two ways. Some reduction of invasive annual grass infestation density would be realized, and it would provide additional forage for permittees potentially at a time when they would not normally have access to permit areas.

The primary beneficial effects of the Proposed Action accrue to, and are discussed under, the *Native Vegetation* section in this Chapter. Potential impacts to livestock forage are secondary effects of achieving rangeland health, maintaining functioning sagebrush-steppe and other late-successional plant communities. In the long term late seral stage plant communities, an expected outcome of the Proposed Action, provide more stable forage supplies, which means the permittee can plan for a given amount of use on BLM-administered lands from year to year. This situation increases grazing permit security, because it means that rangeland health, sage-grouse habitat, fish habitat, and other multiple use objectives are being met

Cumulative Effects

Common to Both Alternatives

Livestock production is a major contributor to the Harney County economy (USDA 2012), and to the extent that management of livestock on public lands facilitates livestock production in the County, it contributes to the County's economy. Both alternatives would help livestock production on public lands.

Reductions in livestock grazing capacity can come from wildfires, wild horses, climate change, changed management emphasis, and invasive plants. Other ground disturbing projects (see Table 3-3, *Foreseeable Actions Potentially Relating to Cumulative Effects*) can also reduce forage. The increase of invasive plants, particularly the invasive annual grasses and the reduced fire return interval associated with them, are cumulative to these other pressures. Under both alternatives, the control of invasive plants and restoration of invasive annual grass dominated areas would benefit livestock far more than the risk from herbicides might harm them.

Fire and Fuels Management

Issues

- How would the alternatives affect wildfire frequency and intensity?

Affected Environment

The potential effects of invasive plants on fire regimes and fire behavior is largely dependent on the structure and characteristics (flammability) of the plants themselves, and their indirect effect of altering the abundance and arrangement of native plant fuels. Invasive plants may reduce fuels in ways that suppress the spread of fire in ecosystems where fire is desirable; or may increase hazardous fuels in ways that increase fire intensity or frequency in ecosystems where it is not (Brooks et al. 2004).

In the Sagebrush Steppe Biome, invasive annual grasses have not just increased fuel loading; they have become sufficiently established to create a self-sustaining cheatgrass-wildfire regime (Chambers et al. 2007). Plant invasions that alter fire regimes typically do so by altering more than one fuel or fire regime property. For example, grass invasions of shrublands increase fire frequency by increasing the amount of fuels (annual grasses), their density, and flammable surface area (Brooks et al. 2004). When an invasive plant with different fuel characteristics is established enough to dominate the landscape, its intrinsic characteristics and effects on native vegetation combine to alter fuel properties sufficiently to shift the historic fire regime outside of the reference range of

variation. If the new fire regime favors the dominance of the invasive plants causing new fuel conditions and negatively affecting native species, an invasive plant / fire regime cycle becomes established (Zouhar et al. 2008).

Native sagebrush plant communities in the Sagebrush Steppe Biome were historically made up of 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. These plant communities had high resilience and resistance to weed invasion. Natural fire return intervals in this type were 32 to 70 years (Quigley and Arbelbide 1997:797). In the past 130 years, invasive annual grasses (particularly cheatgrass) have become established in many sagebrush communities. When wildfires occur, these grasses increase exponentially since they reestablish more quickly and outcompete native plants. Large areas of sagebrush communities have experienced a total vegetation conversion to fire-prone invasive annual grasses (Menakis et al. 2003). Cheatgrass and medusahead rye (noxious) are estimated to moderately or heavily infest more than 800,000 acres on the Burns District. These grasses can increase horizontal fuel continuity and create a fuel bed more conducive to ignition and spread (Zouhar et al. 2008). Approximately 1,053,850 acres on the Burns District has burned by wildfire in the past 22 years (see Table 2-4, *Summary of Recent Wildfire*). In some lower elevation sagebrush, an annual grass fire cycle now exists in which fires burn as often as every three to five years (Chambers et al. 2007).

With the exception of invasive annual grasses, the presence of other invasive plants does not generally contribute to increased fire frequency and intensity.

Treatments Planned Related to the Issues

Common to Both Alternatives

Herbicides would be used as part of an integrated vegetation management approach. Treatment goals would include reducing fire intensity and spread rates to protect resource values and to increase firefighter and public safety, and restoring fire adapted ecosystems or fire regimes through the modification of vegetation structure and composition. Herbicides would be used to help achieve these goals in a number of different ways:

- As a standalone treatment or in combination with other vegetation treatments to change the vegetation structure and composition to reduce fire behavior characteristics (rate of spread, fire line intensities) and facilitate suppression actions;
- As a follow up or maintenance treatment to mechanical or prescribed fire treatments or post wildfire rehabilitation treatments, to either further reduce the fuels hazard or to help control new or existing invasions from occurring or spreading;
- To create strategically placed breaks in invasive annual grass (fuel) continuity adjacent to wildland urban interface communities (where treatment of the entire infested area would be either impractical or too expensive); and / or
- In combination with targeted grazing so herbicide use can be decreased.

No Action Alternative

Herbicide treatment of noxious weeds could have a fuels treatment objective, but the four herbicides currently available under the No Action Alternative are not capable of selectively controlling the invasive annual grasses that create the largest threat of fire. These herbicides are only allowed for use on designated noxious weeds including medusahead rye, but not the other invasive annual grasses that add fuel loading, notably cheatgrass (except where listed in Table 2-7*, Summary of NEPA Covering the No Action Alternative*).

Category 4 can be treated with imazapic in limited areas (see Table 2-7). This would help prevent invasive plants from re-establishing in wildfire burned areas.

Few if any chemical treatments would occur in Category 5 because no herbicide is available under the alternative that is effective against the invasive annual grasses except in the limited areas listed in Table 2-7. Glyphosate is used in high-priority invasive grass monocultures where there are few desirable native species to suffer collateral damage (such as along roads). Such treatments may be used to partition large expanses of invasive annual grass monocultures. Treatment options would otherwise be limited to manual and mechanical methods.

Proposed Action

Imazapic could be used on up to 100,000 acres or more per year depending upon funding and management emphasis, to control invasive annual grasses (Category 5) or to rehabilitate post-fire emergency stabilization areas infested with invasive annual grasses (Category 4). Priority treatment would be given to areas where desirable species are present in sufficient quantities that controlling the invasive annual grasses can benefit intermixed perennials. Imazapic, alone or in combination with sulfometuron methyl, could be used to treat invasive annuals along roads to reduce the likelihood of sweeping unchecked wildfires.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide-related effects to fire and fuels management is minimized for both alternatives by following existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include, but are not limited to:

- Time treatments to encourage rapid recovery of vegetation.
- When appropriate, reseed following burning to re-introduce species, or to convert a site to a less flammable plant association, rather than to specifically minimize erosion.[64]
- Limit area cleared for firebreaks and clearings to reduce potential for weed [invasive plant] infestations.

Environmental Consequences

Common to Both Alternatives

Planned treatments in Categories 1, 2, and 3 would have little effect on fire frequency and intensity at current and expected infestation levels.

No Action Alternative

Under the No Action Alternative, manual and mechanical treatments would be the most effective treatment in removing invasive annual grasses. The reduction of invasive annual grasses through mechanical and manual treatments would be limited and dependent on the current condition of the fire regime prior to treatment, the intensity, severity, size, and seasonality of a fuel treatment, and site factors such as, topography, soil characteristics, and weather conditions (Zouhar et al. 2008). Mechanical methods can create non-vegetated areas that break up fuel continuity, potentially increasing firefighting success and safety. Manual and mechanical treatment areas would likely require annual maintenance or retreatment to remain effective in reducing the fire risk. This cost is likely to keep treatments small in scale, providing protection to limited areas.

Glyphosate is sometimes used for medusahead rye control, but it is ineffective at preventing growth from seeds left in the soil. Because glyphosate is non-selective, it also removes native shrubs and forbs needed to help restore the site. As with prescribed fire, active restoration is usually required. Actual fuel hazard reduction benefits (even

[64] Decisions about seeding are not a part of this EA and would be analyzed in project specific analyses.

in the short term) are limited. The reduction in the severity of fire behavior characteristics (rate of spread, fire line intensities) under the No Action Alternative would be relatively labor-intensive, and benefits would be localized to the area treated.

The herbicides available under the No Action Alternative are not the most effective or efficient herbicides to use on many of the invasive plants species likely to invade. Spread would likely continue at the 12 percent rate under this alternative.

Proposed Action

Herbicides that would become available under the Proposed Action include pre-emergents (e.g., imazapic) that would selectively control invasive annual grasses, making some combination of herbicide-seeding treatments[65] effective at removing these grasses and restoring native vegetation. This treatment could be used to decrease fire return intervals and severity and reduce the risk of fast-moving, intense, grass-fueled fires by breaking up fuel continuity, and somewhat reducing the likelihood of repeated, large-scale wildfires.

Herbicides would also increase the effectiveness of green-stripping – a proactive technique to reduce the magnitude of the cheatgrass-wildfire cycle by growing fire-resistant vegetation at strategic locations in order to slow or stop the spread of wildfires (Quigley and Arbelbide 1997:801). This would increase the likelihood of successfully working with adjacent landowners on fuel breaks and related treatments. Using herbicides to maintain mechanical non-vegetated or brown stripping breaks would reduce the cost of maintaining these areas (See *Costs* section) and increase their effectiveness at reducing fires.

It should be noted that if 817,500 acres of invasive annual grasses (see Table 3-1, *Estimated Treatment Acres*) were treated for the life of the EA (10-15 years), less than one quarter of the Burns District BLM would be treated. In the context of managing vegetation conditions to reduce wildfires, such treatments would be more likely to have an ecosystem rehabilitation benefit and a fire reduction one than the No Action Alternative.

Cumulative Effects

Common to Both Alternatives

Continued increases in invasive annual grasses as well as predicted warmer winters and drier summers will likely usher in larger, more intense, wildfires in the foreseeable future. The current trend of large wildfires and large emergency stabilization and rehabilitation projects is likely to continue.

When wildfires occur, the District would need to separately analyze the effects of emergency stabilization and restoration to treat the invasive plants in those locations. Workload generally precludes timely treatments in the same year as the wildfires occur, which is often the best time to prevent invasive plants from establishing. Under the Proposed Action, treatments could be implemented immediately, preventing invasive plants from establishing.

[65] Decisions about seeding are not a part of this EA and would be analyzed in project specific analyses.

Native American Interests and Uses

Issues

- How would the alternatives affect culturally significant plant species used for Native American subsistence, religious or ceremonial purposes?
- How would the alternatives affect health and safety of Native American people who gather, handle, or ingest plants from in or near treatment areas?
- How would the alternatives affect cultural resources?

Affected Environment

Native American groups have used and occupied the area managed by the Burns District for over 14,000 years, as evidenced by the abundance of archaeological sites. While the overwhelming majority of the lands previously occupied by Native Americans of the region were ceded to the Federal Government to be placed in private ownership or public lands, Native Americans still have an attachment to the lands that they no longer occupy in the form of hunting, fishing, plant gathering, and a general concern that plants of importance to them be maintained on their former lands. Within the District, there are four tribes that used and occupied the area: the Burns Paiute Tribe, Fort McDermitt Paiute Shoshone Tribe, Confederated Tribes of Warm Springs, and Klamath Tribes. The Warm Springs and Klamath tribes have off-reservation treaty rights within the District, but the needs of all four tribes are accommodated as much as possible.

The **Burns Paiute** tribal offices are currently located north of Burns, Oregon, where they have an 11,944-acre reservation. Many tribal members are also related to members of the Ft. McDermitt Paiute Shoshone Tribe. Their seasonal round of subsistence has been described in Couture (1978) and consisted of wintering near protected areas with year-round water, such as the shores of Malheur Lake. The remainder of the year was spent collecting plants and animals in the Harney Basin, upper Malheur River, and southern portions of the forested Blue Mountains north of Burns.

The **Fort McDermitt Paiute Shoshone Tribe** is currently located in McDermitt, Nevada on the Oregon-Nevada border. Many of the tribal members are related to Burns Paiute members through marriage and other blood ties and there is some interchange between the two tribes. While consultations with the tribe have increased over the past several years, the District does not have much specific information about culturally important places.

The **Confederated Tribes of Warm Springs** have members of Paiute heritage and many members have family ties to other groups that used the area. Individuals and groups from Warm Springs have annually traveled to the Biscuitroot ACEC and surrounding lands for root gathering in the spring. Consultation work in the past has indicated that the Confederated Tribes of Warm Springs consider lands within the Burns District a part of their "usual and accustomed places," reserved as a part of their treaty rights. At this time, they have not identified any of these usual and accustomed places.

The **Klamath Tribes** is comprised of the Klamath, Modoc, and Yahooskin Paiute groups. These three separate but related groups were placed together on the Klamath Reservation during the period of relocation of tribes onto reservations in the 1800s. They have specific interests in the western portion of Burns District and have consulted on several projects over the last several years. Their visits to District lands are limited because of the distance between their reservation and the District.

Plant Resources

While the tribes no longer rely solely 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. For instance, seepweed (or wada, as it is known to the Burns Paiute) was a major food plant. The Burns Paiute were known as the "Wada Eaters," and they consider the protection and preservation of these plants to be important to their culture. Plants are mostly used today in cultural ceremonies, special occasions, for medication, and for the perpetuation of cultural traditions within extended families. Great concern is expressed for the preservation of significant plant areas and plant types. While the District does not know how often plants are collected or precisely where, strong indications are given that this is done on a regular basis by all four tribes.

Plants identified as important to Native Americans fall into four categories: food plants, medical plants, ceremonial / religious plants and fiber plants.

Food Plants

While tribes historically used a wider range of plants, the following is a list of the plants that have been identified by the Tribes as being of most importance to them today.

Roots:

- Camas (*Camassia quamash*)
- biscuitroot (*Lomatium* sp.)
- bitterroot (*Lewisia rediviva*)
- yampa (Indian carrot, *Perideridia* sp.)
- onions (*Allium* sps.)
- Sego lily (*Calochortus macrocarpus*)
- yellow bell lily (*Fritillaria pudica*)
- wapato (*Sagittaria latifolia*)

Berries:

- chokecherry (*Prunus virginiana*)
- service berry (*Ameliancher alnifolia*)
- grouse huckleberry (*Vaccinium scoparium*)
- elderberry (*Sambuca nigra*)
- currants (*Ribes cereum*)

Seeds:

- seepweed (wada, *Sueda depressa*)
- balsamroot seeds (*Balsamorhiza sagittata*)
- Indian rice grass (*Oryzopsis hymenoides*)
- Great Basin wild rye (*Elymus cinereus*)

Medicinal Plants

Most members of all four tribes are reluctant to give specific information regarding the types of plants that are used for medication. They fear that doing so would lead to their use by non-native individuals who would compete with tribal members for their use. Medicinal plants include:

- balsamroot (*Balsamorhiza sagittata*)
- tobacco root (*Valerian* sp.)
- wild rose (*Rosa* sp.)
- native tobacco (*Nicotiana* sp.)

Ceremonial / Religious Plants

Any or all of the food and medicinal plants listed above could fall into this category. Most of the food plants are collected and used during ceremonies to celebrate the cultural heritage of these groups. Specific plants used in religious practices are generally not identified by the Tribes for the same reasons that medicinal plants are not identified.

Fiber Plants for Construction

In the past, most of the necessary weapons, tools, baskets, housing, storage containers, etc. were constructed out of native fibers or woods collected and processed by Native Americans. Some members of the tribes still practice

these skills either for personal enjoyment, to earn an income, or simply to preserve cultural traditions and practices. Plants used for these purposes include:

- Indian hemp (*Apocynum cannabinum*)
- willow (*Salix exigua*)
- juniper (*Juniperus occidentalis*)
- mountain mahogany (*Cercocarpus ledifolius*)
- tule (*Scirpus acutus*)
- cattails (*Typha latifolia*)

Known Plant and Ceremonial Areas

Biscuitroot Cultural ACEC

The Biscuitroot Cultural ACEC was adopted in the 1992 Three Rivers Resource Management Plan and a management plan for the ACEC was approved in 1998. The purpose of the ACEC is to maintain populations of edible roots for tribal harvest on 6,500 acres of the Stinkingwater Mountains. Preservation of root plant habitat is the highest management priority. Other nearby areas (2,000 acres) not included within the ACEC were indicated in the Resource Management Plan and ACEC management plan as additional high priority root gathering locations. Many tribally significant plant species found within the ACEC: Bitterroot, six species of biscuitroot, two species of Indian carrot, two species of onion, sego lily, yellow bell lily, balsamroot, currant and squaw apple (*Peraphyllum ramosissimum*).

Stinkingwater Mountains

Other portions of the Stinkingwater Mountains are also rich in edible roots and varieties of fruit plants. While specific locations where roots and fruits are gathered are not known, the geography, soils, and location are similar to the Biscuitroot Cultural ACEC. It is highly likely that plant foods are collected in this geographic area.

Blue Mountains Front Range

Patches of edible roots are somewhat discontinuous along the foothills at the southern edge of the Blue Mountains north of Highway 20. Fruit plants are found on perennial streams that originate in the forested uplands. The area is close to the Burns Paiute Reservation. Plant food gathering areas are assumed to occur there.

West Slope of Steens Mountain

The lower western slopes of Steens Mountain, especially low-sage flats, are populated with some of the important root plant species (onions, biscuitroot, Indian carrot, and bitterroot). The perennial streams and associated basalt rims on the west side of the mountain support berry species such as currant, chokecherry, and elderberry. Approximately 50 percent of the west flank of the mountain between the 6,000-foot elevation to the western edge bounded by Catlow and Donner und Blitzen valleys contains edible plants. This is the largest acreage of edible root habitat on the District. No tribal use is known to occur in this area, probably because other gathering areas are closer to many of the tribes listed above.

North Catlow Uplands

West of the Steens Mountain fault block, marking the west side of the Donner und Blitzen Valley is another fault block range of basaltic base rock. This region supports populations of edible root species. Fruit species are limited to areas around perennial springs and seeps. No tribal use is known to occur in this area, probably because other gathering areas are closer to many of the tribes listed above.

Creeks and River Drainages

Drainages of creeks and rivers of the District often have large stands of willows and red osier dogwood, chokecherry, and other fruit plants. Willows and dogwood are an important source of fiber materials for the manufacture of baskets.

Rims of the District

Most of District is a volcanic area where bedrock of basalt and rhyolite lava flows lie just under the surface. The area is also an area of geologic faulting and fault block tilting. This activity within the lava flows has created many large and small rimrock areas. In the winter, snows drift over the edges of these rims and collect into drifts that can be many feet thick. This moisture creates habitat for plants such as chokecherry, and currants, which can often be abundant along the face of a rim.

Treatments Planned Related to the Issues

Common to Both Alternatives

Cultural plants occur on approximately 213,000 acres of the District. Any of the herbicide and non-herbicide treatments in Categories 1-5 could affect these plants and / or the people gathering plants. However, invasive plants are more likely to be in disturbed areas (including along roads), which are areas less likely to have certain (but not all) of the culturally significant plants.

Invasive annual grasses (particularly medusahead rye) are the greatest threat to edible root populations because they prefer similar sediment types. Although it is unknown how many acres of edible roots species are currently infested with medusahead rye, the estimate of total medusahead rye infested acres is more than 300,000. An additional 886,424 acres are susceptible to infestation (27 percent of the District). The majority (80 percent) of predicted edible root populations are within, adjacent to or within two miles of areas susceptible to medusahead rye infestation.

No Action Alternative

Under the No Action Alternative, treatment methods would include four herbicides District-wide and an additional four (chlorsulfuron, clopyralid, sulfometuron methyl, and / or imazapic) available in limited areas of the District (see Table 2-7*, Summary of NEPA Covering the No Action Alternative*). Overall, treatment flexibility would be more limited than under the Proposed Action and the predicted spread of Category 1, 2 and 4 invasive plant sites would increase. Invasive annual grasses (Category 5) would not be controlled outside of the areas listed in Table 2-7. Treatment of medusahead rye in other areas would not occur. Many of these areas are important to root grounds, which are being adversely impacted by the medusahead rye.

Proposed Action

With additional herbicides available District-wide (including those selective to the invasive annual grasses) areas would be sprayed with imazapic to control medusahead rye and cheatgrass (Categories 4 and 5). This would occur in recently burned areas (Category 4) and to limit spread or to rehabilitate sites more heavily infested with these grasses (Category 5).

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide-related effects to Native American interests, resources, and concerns is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include, but are not limited to:

- Follow guidance under Human Health and Safety Standard Operating Procedures and Mitigation Measures 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.
- 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.
- 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.

Project Design Features Adopted for this Analysis

- At least one month prior to beginning annual treatments, the Annual Treatment Plan will be presented to the affected tribes along with an offer to consult on the Plan. Consultation could identify where treatments can be delayed and where posting would help tribe members avoid treatment areas. Maps of known invasive plant infestations can also be shared with the tribes at this time.
- Where coordination with a tribe about an Annual Treatment Plan identifies areas where herbicide use would not be consistent with cultural values and uses, alternatives will be implemented where feasible, consistent with existing law, regulation, and policy.
- An existing Mitigation Measure requires that "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…" (see Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*). Similar posting for any herbicide use can be made in traditional gathering areas identified by the tribes. Coordination following receipt of the Annual Treatment Plan will help identify where such posting will occur.
- An infestation map or database can be supplied to the tribes any time, and will be supplied with the Annual Treatment Plan. Discussions about the implications of infestations, treatment and coordination ideas and options, possible effects and conflicts relating to those infestations, and related topics would be welcome as part of coordination with the tribes.

Monitoring Adopted for this Analysis

Because of the potential for imazapic applications to be conducted in areas where prairie and meadow roots and other crops are gathered, the district will (at least twice) collect known food crops used by tribes from sprayed areas, test them for residues, and make the results available to the public and the tribes.

Environmental Consequences

Effects of Treatment Methods

Non-Herbicide Treatments

Non-herbicide treatments may affect culturally significant plants, but their directed nature minimizes such a possibility. Prescribed burning associated with rehabilitation treatments could temporarily remove desirable plants if present, but such fires are conducted only once or twice a decade and are either on sites so dominated with invasive plants that there are few desirable native plants on the site, or they are conducted at times of the year and under conditions when edible root plants are dormant. Such fires are conducted at lower intensity than wildfires, and are part of rehabilitation that would provide long-term benefits to culturally significant plants.[66]

Herbicide Treatments

An herbicide-by-herbicide discussion of their potential to harm non-target plants is included in the *Native Vegetation* section in this Chapter. 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. Selective herbicides such as imazapic would reduce this risk on perennial broadleaf plants and perennial grasses but not on most annuals (grasses and broadleaves).. Further, chlorsulfuron, metsulfuron methyl, sulfometuron methyl, imazapic, and imazapyr are effective at very low rates (half ounce to a few ounces per acre). Because of their high potency and longevity, these herbicides can pose a particular risk to non-target plants. Off-site movement of even small concentrations of these herbicides can result in damage to surrounding plants, and damage to non-target plants may result at concentrations lower than those reportedly required to kill target invasive plants (Fletcher et al. 1996, USDI 2010a:145). 2,4-D is a selective herbicide that kills broadleaf plants but not grasses, and is used in many tank mixes. Direct spray and nearby drift can kill non-target plants. Triclopyr is selective to broadleaf and woody plants, and susceptible species could be impacted by drift as far as 1,000 feet away at the maximum rate. Imazapic treatments could contaminate pre- and post-emergent fungi, but there is no potential human health effect from such contamination identified in the Human Health Risk Assessments (see Appendix C).

Human Health Risks from Herbicide Treatments

Human health risks are addressed in the *Human Health and Safety* section in this Chapter, which itself tiers to over 6,000 pages of Risk Assessments closely examining the potential for adverse human health and environmental effects. Within those Assessments, a variety of possible human exposures are examined, including contact with sprayed vegetation, consumption of sprayed fruit and berries, consumption of contaminated water, and consumption of contaminated fish by subsistence populations. The possible herbicide exposure under each scenario was compared with levels of each herbicide known to cause adverse effects in humans. In many cases, the adverse effect was eye or other irritation, typically reversible. Where modeled scenarios resulted in herbicide exposures less than one-tenth of the lowest level to cause an adverse effect, the Risk Assessments (and this EA) consider the herbicide to have “zero” or “no” risk. Where modeled scenarios resulted in exposures between one-tenth and the lowest level to cause an adverse effect, risks were rated as “low.” It is important to note the modeled exposure scenarios were generally conservative, and various uncertainty factors were used wherever data were missing. Risk ratings for all of the modeled exposures, for all 14 of the herbicides, are included in Appendix C, and discussed individually in the *Human Health and Safety* section in this Chapter.

All of the human health scenarios for the public or subsistence populations, including accidental spill scenarios, have zero or no risk except the herbicides discussed in Table 3-29.

[66] Prescribed fire to control invasive plants would only happen on Category 1 and 2 species, and would happen rarely, on the order of a few times a decade.

Table 3-29. Effects of Herbicides (Native American)

Herbicides available under both alternatives	
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.
Glyphosate	Glyphosate has a low risk for consumption of contaminated water, to a child, at the maximum rate. No maximum rate treatments are anticipated.
Herbicides available under the Proposed Action	
Fluridone	Fluridone has a low risk for accidental spill scenario for a berry picker, child and for residential – contaminated water, to a child or adult. Use would be extremely limited, and well posted for this aquatic herbicide.
Triclopyr	Triclopyr has a low risk for consumption of contaminated water, to a child, at the maximum rate, and triclopyr BEE has a low risk at the maximum rate for scenarios of consumption of contaminated fruit; dermal – contaminated vegetation, to a woman; and, direct spray, to a woman, on the lower legs. A Mitigation Measure precludes use of the maximum rate where feasible.

Adverse Effects by Alternative

Common to Both Alternatives

Some of the non-herbicide treatments would be hand pulling of individual plants. Efforts are made to disturb as little of the site as possible because ground disturbance encourages reinfestation or the germination of seed-bank seeds. Broad-scale herbicide and targeted grazing treatments in 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.

Most treatments (Category 1, 2, and 3), particularly those associated with small, new populations, would be treated in late May through August. Many such treatments would be associated with intensive surveys of the District conducted on a three-year cycle. 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 repopulate the site and resist reinfestations. Survey areas, and treatments planned on established sites (Category 1 and 2), would be identified on the Annual Treatment Plan, and coordination would decide if conflicting treatments can be rescheduled or treatment areas need to be posted so people can avoid them.

No Action Alternative

The risk to non-target plants is higher under this alternative than under the Proposed Action because the herbicides available District-wide under this alternative are not as selective as those included in the Proposed Action. See the *Native Vegetation* section for more information.

Of the herbicides used in this alternative, two maximum rate scenarios create a low risk to the public – direct spray, to a child, with 2,4-D, and consumption of contaminated water, to a child, with glyphosate (see Appendix C, *Herbicide Risk Assessment Summaries*). The Risk Assessments show no other health risks associated with all other exposure scenarios for the eight herbicides[67] under this alternative, including those for accidental spill. A Mitigation Measure restricting 2,4-D to typical rates in known traditional use areas, and sharing Annual Treatment Plans with tribes, would substantially reduce this risk.

The use of imazapic for Category 4 and 5 treatments would happen in limited areas on the District (see Table 2-7*, Summary of NEPA Covering the No Action Alternative*). Treatments of invasive annual grasses would not proceed at

[67] Four herbicides available District-wide and four additional available in limited areas on the District (see Table 2-7, *Summary of NEPA Covering the No Action Alternative*).

the pace required to rehabilitate areas (including root gathering areas) already infested. The timing of the treatment would be in the fall, when all edible roots are dormant and not being gathered. Although imazapic has a long residual effect aimed at spring germination of target species, the herbicide is intended to remain on or very near the surface of the sediment column and is not likely to penetrate to the depth of deeply-rooted edible roots nor would it be taken up by above-ground foliage. However, monitoring has been included under the Proposed Action to confirm this. The applied rate of imazapic is intended to kill germinating invasive annual grasses but avoid harm to non-target species. It would be applied at a rate that has no (zero) effect on human health and safety.

Proposed Action

The increase in the herbicides available under the Proposed Action would generally allow for the selection of herbicides that are more target-specific, decreasing the likelihood of damaging or killing non-target species.

None of the herbicides included in this alternative have Human Health Risk Assessment-identified risks under public exposures scenarios at the typical rate, and only fluridone (an aquatic herbicide), triclopyr, glyphosate, and 2,4-D have any identified risk to human health at the maximum rate, even when accidental spill scenarios are considered. The Mitigation Measure restricting these three herbicides to typical rates in known traditional use areas, and the plan of sharing Annual Treatment Plans with tribes, would substantially negate this risk. All herbicide mixtures include dyes to facilitate uniform application and compliance checking. These dyes would also help identify treated vegetation.

Beneficial Effects of Invasive Plant Control

Generally, non-herbicide treatments either are focused on eradicating or limiting known existing infestations (Categories 1 and 2) or preparing an area infested with invasive annual grasses (Categories 4 and 5) for rehabilitation. The treatment methods are intended to preserve remaining non-target species, which would benefit remaining culturally significant plants. Acreage of culturally significant plant species would remain stable or even increase with these treatment methods, in concert with herbicide treatments. Category 1 through 5 herbicide treatments would benefit culturally significant plant species because root and other plant gathering locations would be preserved. Potentially abandoned, infested plant gathering locations could be rehabilitated. The fact that many of the most important species are linked closely to clay-rich sediments and the predilection for medusahead rye to prefer clay-rich soils indicates that Category 5 treatments are the most important to maintain gathering areas and, potentially, increase the number of acres available for gathering.

Cumulative Effects

Common to Both Alternatives

The Alder Creek Restoration Project, Otis Mountain-Moffit Table Restoration Project, North Steens Ecosystem Restoration Project, Dry Lake Ecological Restoration Project, Five Creeks Rangeland Restoration Project, and the northeast portion of Miller Homestead Emergency Stabilization and Rehabilitation Project all are affecting or have the potential to affect edible plant populations on the Burns District. The 447,000 acres of these projects would, at maximum, affect 5 percent (22,350 acres) of edible plant habitat. It is unknown if these areas are actively used for gathering culturally significant plants. All but one of these projects have juniper removal as a major element. Many culturally significant plants (particularly those with edible roots) occur in rocky, low sage flats with low density, scattered juniper. The abovementioned projects focus on denser juniper stands and may produce small, collateral effects on the adjacent low sage flats. Human health and safety risks presented by these projects are none to low.

No Action Alternative

As outlined above, about 22,350 acres of edible plant habitats would be affected by other projects. In addition, treatments of invasive plants in Category 1 would happen on 44,491 acres of the District. The number of acres of edible plant habitat within this acreage is unknown. Most of the limited areas where additional herbicides are available (see Table 2-7*, Summary of NEPA Covering the No Action Alternative*) that are a part of the No Action Alternative do not appear to have the potential to contain substantial edible plant habitat. It is estimated that the total acres of edible plant habitat within those projects is 36,000 acres. The majority of those acres is infested with medusahead rye and has been or would be treated with imazapic. Imazapic applied at typical rates to kill invasive annual grasses, presents no risk to human health and safety.

Proposed Action

As outlined above, about 22,350 acres of edible plant habitats would be affected by other projects. In addition, up to 100,000 acres per year of invasive annual grasses (Category 5) would be treated primarily with imazapic under the Proposed Action. The number of acres of edible plant habitat within this acreage is not precisely known at this time but edible plant habitat often coincides with medusahead rye sites. Imazapic applied at the typical rate is not likely to affect non-target species (including edible plants) and could improve edible plant habitat by removing competition from medusahead rye.

Under the Proposed Action, edible plant habitat on 148,350 acres could be affected by invasive plant treatments (Categories 1, 2, 4 and 5). Category 1, 2, and 4 sites would be treated with herbicides that could present a no to low risk to human health and safety. Imazapic, applied at typical rates to kill invasive annual grasses (Categories 4 and 5), presents no risk to human health and safety.

Recreation and Interpretive Sites

Issues

- How would alternatives affect the recreating public?
- How would the alternatives affect access to recreation sites?
- How would the alternatives affect pets?

Affected Environment

The majority of the Burns District is managed to accommodate multiple uses including many forms of dispersed recreation (e.g., horseback riding, hiking, nature viewing, and hunting), with basic access to these lands provided. Vegetation treatments occurring in these areas would be designed to meet the vegetation objectives outlined in the appropriate Resource Management Plan– the Three Rivers Resource Management Plan for the northern part of the District and the Andrews-Steens Resource Management Plan for the south. Recreational activities on the Burns District tend to take place as dispersed activities, though many developed recreation areas are available.

In 2013, the Steens Mountain Cooperative Management and Protection Area (CMPA) received 221,939 visits. The CMPA attracts out-of-area tourists to the District, with scenic driving routes and overlooks receiving 28-31,000 visits per year on average. The vast majority of activities in the Andrews Resource Area are dispersed recreation, typically by residents of Harney County. Approximately 168,149 people visited the District in 2013. Dispersed camping, and big game and chukar hunting are popular activities. The Alvord Desert OHV Area receives approximately 2,800 visits per year.

The Three Rivers Resource Area had 247,648 visits in 2013, primarily dispersed recreation but also developed recreation at Chickahominy Recreation Site and Poison Creek, Warm Springs, and Moon reservoirs. Radar Hill OHV Area is open year round with 22 miles of designated trails approximately 3.5 miles west of Hines. The Burns Butte Sportsman Club also operates a gun range for archery, trap, sporting clays, rifle and pistol ranges.

Developed recreation sites are one of the areas most at risk for invasive plant infestation on the Burns District.[68] Recreation sites bring together the routes of invasive plant spread: people and recreation equipment, and usually water. Category 1 invasive plants are a particular concern because they can be easily transported from the site to other areas on the District and beyond on equipment, clothing, and pets.

Treatments Planned Relating to the Issues

Common to Both Alternatives

Invasive plants in developed recreation and interpretive sites are high priority for treatment. Infestations are often small, so grubbing, mowing, and other non-herbicide methods may be practical. Non-herbicide methods may also be used to control growth and prevent seeding during the recreation season, delaying the need to use herbicides until site use levels have declined for the season. When herbicides are needed, campground hosts provide outreach to recreationists, and signage is placed throughout the campground in advance of treatments. The herbicide mix contains a blue dye, so the common observer can tell what areas have been sprayed. Campgrounds are typically not closed when localized treatments are planned but in the event that an infestation became severe or where treatments could be hazardous to the public (low-flying aircraft or lots of motorized spray equipment), closures might be necessary for as little as a day or as much as a week. Overlooks would usually not need to be closed, though signage would be used.

Treatments in dispersed areas would be much like the rest of the District. Spot treatments could occur anytime, would not necessarily be signed (although blue dyes are always used), and users and their pets could be potentially exposed to small quantities.

No Action Alternative

The District would continue to use four herbicides and other manual and mechanical treatments for invasive plant control in developed and dispersed recreation areas. For whitetop and other invasive plants not readily controlled with the existing four herbicides, treatments could occur several years in a row.

Proposed Action

The District would have more herbicides from which to choose, and be better able to select an effective herbicide having even less risk to the public than the four available under the No Action Alternative. With more effective herbicides, more acres would be treated over time with less frequency of application (USDI 2010a:135-137).

[68] A key component of BLM's integrated vegetation management strategy is raising public awareness of the threats of invasive plants and including prevention techniques on such things as maps, brochures, informational kiosks, and interpretive signage at trailheads. In addition, when using recreational livestock, the use of pelletized or certified weed-free hay is required throughout the District. See Chapter 2 Background for more information on invasive plant prevention.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

- 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 exclusions, if necessary.
- Use weed-free feed for horses and pack animals.

Project Design Feature Adopted for this Analysis

- Avoid treatments where conflicts with special recreation activities could occur, such as aerial herbicide application in the vicinity of active big horn sheep hunts.
-

Environmental Consequences

Effects of Invasive Plants on Recreation Sites and Users

Invasive plants negatively affect all recreationists regardless of the type of recreation they are involved in. Negative effects range from changes in visual quality, to displacement of native flora and fauna, to actual human injury and other plant defenses. Invasive plant-caused reductions to fish and wildlife would diminish wildlife viewing, fishing, and hunting; would limit access and cause injuries; and would generally lower aesthetic value of the recreational experiences – all proportional to the number of acres infested. Finally, the invasive annual grasses affect dispersed users directly by reducing native habitats, and indirectly as they increase the likelihood of large wildfires. Invasive plants are projected to continue to spread on the District under both alternatives.

Effects of Treatment Methods to Recreation and Interpretive Sites

Common to Both Alternatives

Control treatments for invasive plants have an effect on recreation. For example, the noise associated with mechanical methods of treatment may adversely affect the recreational experience of a visitor. Mowing and other mechanical treatments could throw debris towards users. Dead and browned vegetation from herbicide treatments could temporarily reduce visual quality until vegetation recovered. Herbicide treatments could potentially pose some health risks to recreational users and / or their pets (see the *Human Health and Safety* section later in this Chapter), although exposures are limited by Standard Operating Procedures (see Appendix A) and adverse effects are very unlikely. Campgrounds could be closed for as little as a day or as much as a week to treat severe infestations. Such plans are widely advertised well in advance, but there is no way to reach all users. Frustration can result when a favorite or planned site is not available.

Unintended effects of herbicides on non-target plants, animals, and water could also affect recreation activities (e.g., hiking, plant collecting, hunting, and fishing). The risks to non-target species from use of the herbicides are discussed in the *Native Vegetation, Fish*, and *Wildlife Resources* sections in this Chapter. Application crews and equipment could disturb big game during hunting season. This could be an especially significant problem if aerial application equipment disturbs bighorn sheep during special hunts that are a once-in-a-lifetime opportunity for a hunter, and a project design feature to avoid such conflicts is analyzed as part of the Proposed Action.

Hunting dogs and other pets could potentially be exposed if they run through very recently treated vegetation. However, most treatment areas are small, and dyes (and signs at least in developed sites) would alert owners of treatments. In any case, however, the likelihood of getting a toxic dermal dose from any of the herbicides proposed in either of the alternatives is negligible (see the individual herbicide risk discussions in the *Wildlife Resources* section in this Chapter).

Overall, vegetation treatments would have short-term negative effects and long-term positive effects on recreation. Prevention / removal of invasive plants would maintain / return public lands to a more "natural" or "desirable" condition, which hikers and nature enthusiasts would likely value over degraded lands. In addition, the increased aesthetic value of protected or restored sites would benefit most recreational users. In some instances, treated sites could become more desirable as destinations for outdoor activities, making them more popular to recreational users. Controlling invasive plants would allow native vegetation to reclaim sites, enhancing fish and wildlife habitat to the benefit of hunters, birdwatchers, and other users of these resources.

Proposed Action

The Proposed Action is projected to reduce invasive plant spread by about 40 percent when compared to the No Action Alternative, and would provide an herbicide selective for the invasive annual grasses, potentially reducing the incidence of large-scale wildfires. These benefits would protect the resources that attract dispersed and developed site users, and reduce (comparatively) the direct effects of invasive plants on recreationists and their pets.

Cumulative Effects

The use of additional herbicides under the Proposed Action has no adverse effects to recreation. Though some temporary, localized effects may be expected, long-term effects would be beneficial. As recreation sites often serve as vectors for invasive plant spread, improved control of invasive plants at these sites would reduce the likelihood that recreationists would transport invasive plants to other sites throughout the District or State.

Special Management Areas

Issues

- How would the alternatives affect Special Management Areas?
- How would landing aircraft for invasive plant management affect wilderness characteristics?

Affected Environment

Special designations include areas of designated Wilderness, Wilderness Study Areas, Wild and Scenic Rivers, Lands with Wilderness Characteristics, and Areas of Critical Environmental Concern (ACECs) including Research Natural Areas (RNAs).

Wilderness

The overarching management direction for wilderness is the *Wilderness Act of 1964* (P.L. 88-577). The primary purpose of the *Wilderness Act* is the preservation of wilderness character, while providing for public use and enjoyment in a manner that would leave wilderness unimpaired for future use.

In October 2000, Congress passed the *Steens Act* designating 428,156 acres as the Cooperative Management and Protection Area (CMPA) and establishing the Steens Mountain Wilderness on 170,202 acres of public land within the boundary of the CMPA. The *Steens Act* designated 97,229 acres within the Wilderness as a No Livestock Grazing Area. The last of the permitted livestock was removed from the No Livestock Grazing Area in 2004, although incidental grazing with recreational livestock or targeted grazing is still allowed. The remainder of the wilderness is still grazed by livestock. There is an existing, gated road within the wilderness used by an inholder, agents of the inholder, contractors, and BLM personnel in the performance of their duties. The route is not open to the public. BLM use is estimated to be one or two times per year. The BLM administers the Steens Mountain Wilderness in accordance with the provisions of the *Wilderness Act*, BLM Wilderness Regulations (43 CFR 6300), BLM Manual 6340 Management of Designated Wilderness, House Report 101-405-Appendices A and B, and the specific directives of the *Steens Act*. This is the only designated wilderness on the Burns District.

Wilderness Act prohibitions and direction pertinent to this analysis includes:

> Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.
>
> Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

BLM Manual 6340 – *Management of Designated Wilderness* provides guidance for wilderness management including:

> **General principles.** Generally, wilderness areas must, at a minimum, be managed to maintain the baseline degree of wilderness character that existed when the area was designated by Congress. When possible, management activities should emphasize enhancement of wilderness character over time. Natural processes should always be favored to restore disturbed vegetation in order to maintain the *Untrammeled, Natural*, and *Undeveloped* qualities of wilderness character, as well as outstanding opportunities for *Solitude or Primitive and Unconfined Recreation*. However, in some cases, restoration management activities may be needed to restore vegetation and to preserve or enhance the area's wilderness character, despite the impacts of such activities on the untrammeled quality of wilderness character. The need for active restoration and the alternatives available for conducting restoration activities must be analyzed using the Minimum Requirements Decisions Guide (MRDG). The qualities mentioned above are further defined, in part, as:
>
> > *Untrammeled:* The untrammeled character of the wilderness is impaired by human activities or actions that control or manipulate the components or processes of ecological systems inside wilderness;
> >
> > *Naturalness:* Wilderness ecological systems should be as free as possible from the effects of modern civilization. This quality may be affected by intended or unintended effects of human activities on the ecological systems inside the wilderness;
> >
> > *Undeveloped:* Wilderness has minimal evidence of modern human occupation or modification; and,

Solitude or Primitive and Unconfined types of Recreation: Wilderness provides opportunities for people to experience: natural sights and sounds; remote, isolated, unfrequented, or secluded places; and freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance.

Vegetation. Whenever possible, the BLM would rely on natural processes to maintain native vegetation and to influence natural fluctuations in populations within wilderness. Natural disturbance processes, including fire, insect outbreaks, and droughts, are important shapers of the ecosystem. In some cases, vegetation in a wilderness has been altered by past human activities. Fire suppression, livestock grazing, and introduction of invasive plants are examples of activities that may have changed the vegetative composition within the wilderness.

Manipulation of vegetation through prescribed fire, chemical application, mechanical treatment, or introduced biological agents, is normally not permitted. Exceptions may include emergencies, actions taken to recover a federally listed threatened or endangered species, control of non-native species, and restoration actions where natural processes alone cannot recover the area from past human intervention. All management activities must be designed to strive towards natural vegetative composition and processes that reflect what would likely have developed with minimal human influence.

Management actions may be taken to restore vegetation to characteristic conditions of the ecological zone in which the area is situated, to the extent that they would not cause unacceptable impacts to other components and processes of the ecosystem or to wilderness character as a whole and where:

I. natural successional processes have been disrupted by past human activity and to the extent that intervention is necessary in order to return the ecosystem to a condition where natural process can function; or

II. restoration through natural processes would require lengthy periods of time during which the impacted area would suffer other degradation of wilderness character without intervention

Invasive Plants

There are currently 11 Category 1 species occupying 211 acres on 148 separate sites within the wilderness. Over 200 of these acres are Mediterranean sage or Canada, bull, or Scotch thistle. Most sites are near the gated access road or other access, and receive regular control treatments. Invasive plants have essentially been eradicated on some of these sites, but they are considered active and continue to be regularly monitored.

Wilderness Study Areas

Wilderness Study Areas are areas that the BLM has identified as having wilderness characteristics. The initial task of identifying areas suitable for wilderness preservation was completed as mandated in Federal Land Policy and Management Act (FLPMA) Section 603, and is documented in BLM 1989 Oregon Final Wilderness EIS and Wilderness Study Report for Oregon (USDI 1991c), and includes recommendations. While the President subsequently passed his recommendations on to the Congress in 1991, Congress has yet to act on the majority of these recommendations. In the interim, Wilderness Study Areas are managed in accordance with the BLM Manual 6330 – *Management of Wilderness Study Areas* (USDI 2012e) to preserve their wilderness character, pending action by Congress.

A Congressional mandate of non-impairment, the primary standard for interim management, directs land under wilderness review be managed so as not to impair its suitability for preservation as wilderness. Wilderness values, described in Section 2 (c) of the *Wilderness Act of 1964* (P.L. 88-577), must be protected in Wilderness Study Areas. The BLM's Wilderness Study Area Manual directs that activities must comply with specific policy guidance and policies for specific activities, including the following non-impairment criteria:

a. The use, facility, or activity must be temporary. This means a temporary use that does not create surface disturbance or involve permanent placement of facilities may be allowed if such use can easily and immediately be terminated upon wilderness designation.

b. When the use, activity, or facility is terminated, the wilderness values must not have been degraded so far as to significantly constrain the Congressional prerogative regarding the area's suitability for preservation as wilderness.

Actions that clearly benefit a Wilderness Study Area by protecting or enhancing these characteristics are allowable even if they are impairing, though they must still be carried out in the manner that is least disturbing to the site.

Table 3-30 shows the 24 Wilderness Study Areas that occur on the Burns District.

Table 3-30. Wilderness Study Areas

Name	Acres	Name	Acres
Alvord Desert	97,759	Malheur-Bluebucket	5,529
Basque Hills	72,083	Pueblo Mountains	73,563
Blitzen River	31,902	Red Mountain	15,659
Bridge Creek	14,325	Rincon	104,979
Disaster Peak	3,628	S. Fork Donner und Blitzen	27,969
East Alvord	22,161	Stonehouse	22,766
Hawk Mountain	24,226	Sheepshead Mountains	21,679
Heath Lake	21,197	Table Mountain	39,886
High Steens	14,089	West Peak	8,598
Home Creek	1,165	Wildcat canyon	8,543
Lower Stonehouse	7,449	Willow Creek	2,424
Mahogany Ridge	27,331	Winter Range	15,517
		Total Acres on District	**683,425**

Invasive Plants

There are currently 14 Category 1 species occupying 561 acres on 388 separate sites within wilderness study areas. Three species make up 514 of these acres, Canada, bull, and Scotch thistle.

Wild and Scenic Rivers

In 1968, Congress passed the *Wild and Scenic Rivers Act* establishing a nationwide system of outstandingly free-flowing rivers. The primary purpose of the *Wild and Scenic Rivers Act* is to balance river development with river protection and conservation.

The twelve Wild and Scenic River segments on the Burns District fall all or mostly within the wilderness portion of the Steens CMPA. Some segments were designated by the 1988 *Omnibus Oregon Wild and Scenic Rivers Act*, while the others were designated by the *Steens Act*. Rivers are classified by Congress as Recreational, Scenic, or Wild usually depending on the extent of development and access along each river at time of designation; all of the designated river segments in the CMPA are classified as Wild. River segments with a Wild classification are generally inaccessible except by trail, with watersheds and shorelines essentially primitive, and waters unpolluted. Several river segments within the CMPA have roads, recreation facilities, and historic structures that existed at the time of designation. There is a concrete bridge spanning the Donner und Blitzen Wild and Scenic River along South Steens Loop Road. These facilities continue to be maintained and would be replaced as necessary to provide for public health and safety and resource protection. However, the large majority of river segments are primitive in character.

The *Steens Act* also designated the Redband Trout Reserve along that portion of the Donner und Blitzen Wild and Scenic River that is within the wilderness, to be managed consistent with the *Wilderness Act* and the *Wild and Scenic River Act* (*Steens Act* Sec. 302 (e)(1)).

The intent of the *Wild and Scenic Rivers Act* is to maintain the free-flowing character of designated rivers and to protect and enhance their specific *Outstandingly Remarkable Values*. *Outstandingly Remarkable Values* are rare, unique, or exemplary from a regional or national perspective, and are classified as Scenery, Geological, Recreational, Fish, Wildlife, Vegetation, Botanic, Cultural, and Historic. The Outstandingly Remarkable Values for each river segment are shown on Table 3-31. Many *Outstandingly Remarkable Values* for designated river segments also contribute to the unique character of the Steens Mountain Wilderness.

Table 3-31. Wild and Scenic River Segments

Segment	Description	Outstandingly Remarkable Values [3]	Miles	Acres	In Wilderness
Donner und Blitzen Wild and Scenic River Segments					
A[1]	Donner und Blitzen River	S,G,R,F,W,V	13.9	2,540	Except 19 acres in Page Springs Campground and 73 other acres
B[1]	Little Blitzen River	S,G,R,F,W,V,C,H	14.1	6,206	Except 850 acres of Riddle Ranch
C[1]	South Fork Donner und Blitzen River	S,G,R,F,W,V	14.9 BLM 3.0 Private	2,730 BLM 758 Private	Except 67 acres in a Wilderness Study Area
D[1]	Big Indian Creek	S,G,R,F,W,V	12.2	5,165	Except 28 acres along Steens Loop Road
E[1]	Little Indian Creek	S,G,R,F,W,V	4.2	1,362	Yes
F[1]	Fish Creek	S,G,R,F,W,V	6.5 BLM 8.0 Private	1,236 BLM 2,586 Private 40 State	Except 78 acres in Jackman Park Campground and 89 other acres
G[1]	Mud Creek	S,R,F,W	5.1	1,515	Yes
H[1]	Ankle Creek	S,R,F,W	6.0 BLM 2.1 Private	1,656 BLM 638 Private	Yes
I[1]	South Fork Ankle Creek	S,R,F,W	1.6	476	Yes
Wildhorse Wild and Scenic River Segments					
J[2]	Little Wildhorse Creek	S,R,W,B	2.6	922	Yes
K[2]	Wildhorse Creek	S,R,W,B	7	2,096	Yes
Kiger Wild and Scenic River Segment					
L[2]	Kiger Creek	S,R,F,W,B	4.25	1,420	Yes

1. Rivers designated by the *1988 Omnibus Oregon Wild and Scenic Rivers Act*. Note: River miles may vary slightly from the 1988 legislation due to improvements in mapping data.
2. Rivers designated by the *Steens Act*.
3. *Outstandingly Remarkable Values*: S=Scenery, G=Geological, R=Recreational, F=Fish, W=Wildlife, V=Vegetation, B=Botanic, C=Cultural, H=Historic

Of the nine Outstandingly Remarkable Values, the ones most relevant to this analysis are *Vegetation* and *Botanical.* The first six segments listed on Table 3-31 include the *Vegetation* Outstandingly Remarkable Values for the diversity of plant communities. These segments include riparian zones dominated by willows, western birch (*Betula papyifera*), mountain alder, black cottonwood, and quaking aspen, as well as other species. In addition, sedge and grass-dominated meadows, bog areas, springs, seeps, a variety of wetland communities, high elevation cirque communities, and numerous other alpine and subalpine communities are found within this system. The uplands include areas dominated by big sagebrush, western juniper, mountain mahogany, quaking aspen, and mountain snowberry with Idaho fescue, bluebunch wheatgrass, needlegrasses, and numerous other species in the

understory. Many Bureau Sensitive plant species have been documented within the river corridors. These include species occurring in Oregon only on the Steens, and other species of special interest.

The Wildhorse segments include the *Botanical* Outstandingly Remarkable Values because the headwaters of Little Wildhorse Creek are designated as a RNA / ACEC because of a mid-to high-elevation lake and associated ecosystem. This RNA / ACEC was designated to protect the area for scientific study opportunities. Wildhorse and Little Wildhorse Creeks, above their confluence, contain interesting and unique assemblages of vegetative communities.

The Kiger Wild and Scenic River includes the *Botanical* Outstandingly Remarkable Values because of unique botanical sites. Wet meadows interspersed with willow hummocks are habitat for several Special Status plant species including pinnate grapefern, Cusick's draba, and foetid sedge. Drier, rocky areas adjacent to meadows contain Steens Mountain penstemon, weak-stemmed stonecrop, and sky pilot. Located above the meadows are cirque lakes perched on the side of the canyon wall at edges of lateral moraines. Areas around these lakes display vegetation that grows in other canyon sections but later in the season due to late-lying snowdrifts.

Invasive Plants

There are currently nine Category 1 species occupying 41 acres on 63 separate sites within the wild and scenic river corridors. Thirty-nine of these acres are Canada thistle.

Lands with Wilderness Characteristics

Although the BLM's authority to designate Wilderness Study Areas or recommend new wilderness areas has expired, Section 201 of FLPMA requires the BLM to maintain on a continuing basis an inventory of all public lands, their resources, and other values, which includes wilderness characteristics. Such lands must possess sufficient size, naturalness, and outstanding opportunities for either solitude or primitive and unconfined recreation. In addition, it may also possess supplemental values. The BLM may manage, through the Resource Management Plan process, lands newly found to have wilderness characteristics to affect, protect, or preserve their wilderness characteristics. Land use plan decisions include, but are not limited to, Visual Resource Management class designation, ATV and mechanized vehicle designation, lands and realty designations, and conditions of use to be attached to permits, leases or other authorizations.

Parcels with wilderness characteristics in the CMPA have not been provided special management status. Parcels are to be managed according to Resource Management Plan direction for surrounding non-Wilderness Study Area land. The protections afforded (e.g. the mineral withdrawal, prohibition on cross-county motorized / mechanized vehicle use, and adjacent right-of-way avoidance / exclusion areas) were considered as providing sufficient protection to meet the goals and objectives of the Resource Management Plan.

Outside of designated wilderness and WSAs, fourteen areas were found to possess wilderness characteristics within the Burns District. These areas are not bound by District boundaries; they are defined by geographic boundaries such as roads and rights-of-way. Some areas lie on more than one BLM District. Burns District shares lands with wilderness characteristics with Vale and Lakeview Districts. For this analysis, only the acres on Burns District were considered. Total acreage of lands with wilderness characteristics on Burns District is 76,244 acres.

Invasive Plants

There are currently six Category 1 species occupying 87 acres on 47 separate sites within the areas possessing wilderness characteristics. More than 85 of these acres are whitetop or Scotch thistle.

Areas of Critical Environmental Concern

On the Burns District, there are 22 ACECs and / or RNAs. An ACEC is a parcel of public land that requires special management attention to protect relevant or important values. A RNA is a subcategory of ACEC that contains natural resource values of scientific interest and is managed primarily for research and educational purposes. On the Burns District, ACEC / RNAs occupy approximately 111,800 acres, approximately 20,700 on the Three Rivers Resource Area and 91,100 on the Andrews / Steens Resources Area. Table 3-32 shows the ACEC / RNA name, acres, Resource Area, and the designation and primary resources.

Table 3-32. Areas of Critical Environmental Concern and Research Natural Areas

ACEC Name	Type	Designation	Acres	Resource Area	Analysis Area
Alvord Desert	ACEC	To protect sand dune series; big sagebrush / greasewood community; playa and playa margin communities; greasewood / saltgrass community; big sagebrush / spiny hopsage community; shadscale / spiny hopsage / budsage community.	16,700	Andrews and Steens Mountain CMPA	Upland Vegetation
Big Alvord Creek	RNA	First to third order stream system with a high gradient reach in a sagebrush zone including intermittent streams with mountain alder and dogwood; big sagebrush / bluebunch wheatgrass community;black cottonwood riparian community.	1,676	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian
Biscuitroot	ACEC	Protect culturally important Traditional plant uses	6,513	Three Rivers	Cultural Practices
Borax Lake	ACEC	To protect the habitat of the federally endangered Borax Lake chub.	759	Andrews and Steens Mountain CMPA	SSS Fish
Dry Mountain	RNA	To protect a complete transition from lowsagebrush / Sandberg's bluegrass to ponderosa pine savanna.	2,084	Three Rivers	Upland Vegetation
East Fork Trout Creek	RNA	To protect a riparian community dominated by quaking aspen and Scouler willow, a high-elevation wet meadow dominated by sedges and a first-to-third order stream system originating in the subalpine zone.	361	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian
East Kiger Plateu	RNA	To protect a high elevation fescue grassland with special status plants which include: Steens Mountain paintbrush, Cusick's draba, weak-stemmed stonecrop; foetid sedge and Davidson's penstemon.	1,215	Andrews and Steens Mountain CMPA	Upland Vegetation
Fir Groves	ACEC	To protect a dense stand of old and middle age class grand fir trees on one site a mix of old and young trees on a smaller site. This area is one of the last places on Steens Mountain containing grand fir.	477	Andrews and Steens Mountain CMPA	Upland Vegetation
Foster Flat	RNA	To protect a silver sagebrush / Nevada bluegrass community.	2,686	Three Rivers	Upland Vegetation
Kiger Mustang	ACEC	Protect the characteristics of Kiger Mustangs.	68,044	Three Rivers, Andrews and Steens Mountain CMPA	Wild Horses

ACEC Name	Type	Designation	Acres	Resource Area	Analysis Area
Little Blitzen	RNA	To protect terrestrial and aquatic ecoststems which include a mid to high elevation vernal pond; a stream system originating in the subalpine, aspen grove and alpine communities on the Steens Mountain.	2,254	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian
Little Wildhorse Lake	RNA	To protect a pristine mid-to-high elevation lake which contains rims and upper-elevation plant communities in good to excellent condition.	241	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian
Long Draw	RNA	To protect a unique terrestrial ecosystem containing Indian ricegrass and needleandthread needlegrass in associatino with Wyoming big sagebrush.	440	Andrews and Steens Mountain CMPA	Upland Vegetation
Mickey Basin	RNA	To protect an ecosystem consisting of a winterfat plant community growing in a nearly pure stand on ash soils.	559	Andrews and Steens Mountain CMPA	Upland Vegetation
Mickey Hot Springs	ACEC	To protect a hot springs complex containing 50 active and inactive vents, including a mud pot, hot pools and cool pools.	42	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian
Pueblo Foothills	RNA	To protect an ecosystem recognized as being the best example of a Morman tea / narrowleaf cottonwood community complex.	2,423	Andrews and Steens Mountain CMPA	Upland Vegetation
Rooster Comb	RNA	To protect a terrestrial and aquatic ecosystem both of which are determined to be the best examples of mountain mahogany / bluebunch wheatgrass community and a black cottonwood riparian community.	682	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian
Serrano Point	RNA	To protect a playa with greasewood and basin wildrye, big sagebrush / greasewood communities and greasewood / shadscale / bunchgrass playa margin communities.	678	Andrews and Steens Mountain CMPA	Upland Vegetation
Silver Creek	RNA	To protect a first to third order stream system in the Blue Mountains originating in Ponderosa pine zone including intermittent streams, big sagebrush / bunchgrass communities inside a forest zone and a low sagebrush / Idaho fescue community.	1,934	Three Rivers	Upland Vegetation / Riparian
South Fork Willow Creek	RNA	To protect alpine communities on Steens Mountain and a stream system originating in a glacial cirque.	186	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian
South Narrows	ACEC	To protect the only existing sites and designated critical habitat of Malheur wire-lettuce, federally listed as critically endangered.	161	Three Rivers	Special Status Species - Plants / Upland Vegetation
Tum Tum Lake	RNA	To protect low elevation alkaline lake and salt desert shrub communities.	1,689	Andrews and Steens Mountain CMPA	Upland Vegetation / Riparian

Invasive Plants

There are currently 12 Category 1 species occupying 1,434 acres on 1,502 separate sites within the ACECs. Five invasive plants, whitetop, diffuse knapweed, and Canada, bull, and Scotch thistle make up more than 1,420 of these acres. Regular inventories are done to document invasive plants.

Treatments Planned Relating to the Issues

Common to All Special Management Areas

Except as described below, invasive plant treatments could be conducted using hand tools, motorized tools, using ATVs to transport herbicides, by aircraft, and (rarely) with targeted grazing and / or prescribed fire. Based on most invasive plants in special areas being thistles, knapweed, or whitetop, the most common herbicides used in Special Management Areas would be picloram and 2,4-D, with some clopyralid, chlorsulfuron, and dicamba. Picloram would be less likely to be used in wild and scenic river areas because of long half-life and its tendency to move in sandy or gravely soils.

Wilderness

As noted in the *Invasive Plants* section earlier in this Chapter, the District has been treating two spotted knapweed infestations in a very remote location in the Steens Mountain Wilderness since 2006. In 2012, one site was 0.02 acres while the main infestation was 0.22 acres. These sites are located close to the eastern rim of Wildhorse Creek, not in the area of the existing inholder access road, and access is difficult from any direction. At the larger site, the plants are scattered across approximately 50 acres of dense brush and herbaceous vegetation and are difficult to locate. Control treatments need to be conducted during full flower, generally August, for maximum effectiveness. Lightning storms are common at this time, and the high, flat plain on which these infestations are located is a prime target for strikes. Wildfires can spread quickly, and there are no safe areas to which a crew could withdraw. In the No Action Alternative, the control crew would set up a base camp along Ankle Creek and ride horses in to the site to treat the infestation, a 13-hour round trip.

In 2013, fire danger was especially high and helicopter access to the site was proposed as a way of reducing the control crew's exposure to a possible wildfire. A wilderness Minimum Requirements Decision Guide (MRDG) was prepared in consultation with the BLM State Office, and the flight appeared consistent with the Travel Management Plan for the CMPA. The flight was scheduled after big horn sheep hunting season, as this is a prime location for those hunts. The helicopter flight took seven minutes to fly in, the spotted knapweed was treated in three hours, and the flight out took another seven minutes.

2014 was another very dry year that followed a wet spring, and the vegetation on Steens Mountain was especially tall and dry. The District determined, however, that the MRDG and Travel Management Plan analysis was not adequate NEPA analysis for this action, and the control action was not conducted. It is likely that this situation would continue to occur. Helicopter access to these sites or other sites that might show up in remote, inaccessible locations in the wilderness would make it more likely that timely control treatments could occur when wildfire safety concerns preclude accessing the sites via normal ground methods. A proposal to access these sites via helicopter in the future is part of the Proposed Action in this EA.

Helicopters have been used within the Steens Mountain Wilderness in the past, as follows:

2009 Helicopters were used to pick up and transport out bundles of marijuana found growing in the Wildhorse Canyon wilderness area on the east side of the Steens. No landing.
2009 Additional surveillance flights were conducted over the wilderness because of the previous Wildhorse Canyon marijuana find. No landing.
2009 Helicopter used to gather wild horses in the South Steens HMA, which includes portions of the wilderness. No landing.
2010 Helicopter surveillance flights were initiated for marijuana grow site interdictions. No landing.
2010 Oregon Department of Fish and Wildlife landed a helicopter in the wilderness as part of their efforts to put radio collars on approximately 50 Big Horn Sheep. Landed.
2011 Three helicopters were used in tandem for additional drug interdiction surveillance efforts. No landing.

2012 Helicopter used to inventory wild horses in the wilderness. No landing.
2013 Helicopter used to transport weed strike team into the wilderness to treat spotted Knapweed infestations. Landed.
2013 Helicopter used to inventory wild horses in selected portions of the wilderness. No landing.
2013 House Creek Fire suppression activities used helicopters to supply hand crews at spike camps and provided bucket drops for fire suppression. No landing.
2014 The South Steens HMA Gather EA authorized helicopter use in the wilderness. No landing anticipated.
2014 South Steens Complex fire suppression activities used helicopters to supply hand crews at spike camps and provided bucket drops for fire suppression. No landing.
2014 Helicopters responded to fire starts in the wilderness by hovering on the scene and reporting to dispatch. No landing.
2014 BLM issued a commercial film permit, which allowed hikers to be videoed from a helicopter as they crossed the Steens Mountain Wilderness. No landing.

Other than ATV access on the existing road system, no other motorized equipment would be used in the wilderness area.

Wild and Scenic Rivers

Because nearly all of the Wild and Scenic Rivers are within wilderness and the terrain is difficult, ATV access is precluded. Targeted grazing is not suitable for any of the invasive plants currently within any Wilderness Study Areas. Treatments conducted within river segments with *Vegetation* or *Botanical* Outstandingly Remarkable Values would be planned with those values in mind, the same as for Special Status plants elsewhere, and appropriate Standard Operating Procedures and Mitigation Measures would apply.

Access to the Wild and Scenic River corridors is limited. Points of access are constrained by the lack of roads that intersect the rivers. The points of access that do exist are located on existing roads or next to public campgrounds. A summary of the access points follows:

Riddle Brothers Ranch - Cold Spring Road leads from the Steens Mountain Road to the Ranch. The road passes through the Little Blitzen Wild and Scenic River corridor and parallels the river within the corridor for approximately 2.5 miles. Treatments are applied from an ATV or a backpack sprayer to invasive plants growing next to the road.

Page Springs Campground - The mouth of the Donner und Blitzen Wild and Scenic River lies on the south end of the campground and is accessed by a footpath called the Blitzen Trail. The trail is not suitable for motorized transport. Backpack sprayers or biological controls are used in this location.

Blitzen Crossing on the South Loop Road - The Steens Mountain Road (the south loop portion) crosses the main stem of the Donner und Blitzen Wild and Scenic River at the Blitzen Crossing Bridge. This area uses motorized transports to apply treatments along the roads edge. However, any treatments away from the edge of the road are done using backpack sprayers because of rough terrain.

Mud / Ankle Creek - The Mud / Ankle Creek road is a permitted route used by an in-holder to access private lands within the wilderness. Public access is not allowed. This route crosses three Wild and Scenic River corridors: Indian Creek, Mud Creek, and Ankle Creek. Where the road crosses the Wild and Scenic River corridors, an ATV could apply treatments along the road edge. Where invasive plants occur farther from the edge of the road where the motorized transport can access, a backpack sprayer is used.

Bill Tabor Cabin - The cabin is accessed from a route called Three Springs Way. The way ends at the wilderness boundary but the track on the ground continues to the river. It is administratively closed to motorized transport from the wilderness boundary to the South Fork of the Donner und Blitzen Wild and Scenic River, a distance of

approximately one-quarter mile. Invasive plant treatments may still occur on final leg of the route. Motorized transport can be used by authorized BLM personnel in the performance of their duties. An ATV could be used for treatments along the edge of the route and backpack sprayers are used for treatments farther from the road edge then the ATV unit can reach.

Burnt Car - Burnt Car Road ends at the edge of the wilderness boundary, Surface disturbances have occurred in past years. The disturbances reach from a designated vehicle parking area, to the edge of the rim rocks overlooking the main stem of the Donner und Blitzen Wild and Scenic River Invasive plant treatments in this area include a combination of methods. An ATV could be used for treatments along the road and a backpack sprayer is used in areas closer to the rim rocks, which would be in the Wild and Scenic River corridor.

Areas of Critical Environmental Concern (ACECs) / Research Natural Areas (RNAs)

Protection of ACECs and RNAs is emphasized. In other words, ACECs and RNAs are, acre for acre, more likely to be treated than other areas on the District if they become infested. As with Wild and Scenic River segments, treatments within ACECs and RNAs are subject to the Standard Operating Procedures and Mitigation Measures applicable to the resources for which the area was designated. Additional buffers, for example, may be needed in those areas designated for listed, Bureau Sensitive, or otherwise outstanding botanical features.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

- 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.
- Control of weed infestations shall be carried out in a manner compatible with the intent of Wild and Scenic River management objectives.

Environmental Consequences

Effects Common to all Special Management Areas

Invasive plant populations are generally smaller and less frequent within Special Management Areas than in the remainder of the District, in part because of the isolated and restricted use nature of many of the Special Management Areas, and in part because small invasive plant populations within Special Management Areas are a high priority for control, before they spread and begin to compromise the values for which the Special Management Area was designated. As described in the *Invasive Plant* section of this Chapter, the additional herbicides that would be available under the Proposed Action would improve the BLM’s ability to control invasive plant populations more quickly, with fewer treatments, and with better protection of adjacent resources, when compared to the No Action Alternative.

Implementing manual, fire, mechanical, biological control and herbicide treatments could adversely affect native vegetation, disturb the ground (although not permanently), and could affect solitude. However, treatments would generally protect or improve the relevant and important values of native plant communities, cultural plants, wildlife habitat, and overall ecological integrity in these areas over the long-term by removing or reducing invasive plants. A more detailed discussion of the potential impacts to vegetation, wildlife habitat, cultural plants, Special Status plants, wild horses, and fish can be found in the resource sections in this Chapter.

Wilderness

No Action Alternative

The two remote spotted knapweed populations deep within the wilderness would continue to be treated by teams accessing the sites by horseback. These sites would not be treated in years where fire danger poses an unacceptable risk for teams so far from safe zones or rapid egress. Missing a treatment year would slow control and could allow the plant population to increase, making future control more difficult.

Proposed Action

Non-conforming uses in wilderness are generally evaluated against the *Untrammeled, Natural*, and *Undeveloped* qualities of wilderness character, as well as outstanding opportunities for *Solitude or Primitive and Unconfined Recreation*, identified as objectives in the *Wilderness Act*. The proposed helicopter use is evaluated as follows:

Untrammeled: The transport of weed strike teams to their work site with helicopters has no effect on the ecological conditions in the wilderness. The invasive plant management process at the site, however, is a trammeling and diminishes the untrammeled character of the wilderness.. The presence of invasive plants in the wilderness remind the intermittent hiker that humans have been in that location. The Proposed Action would improve the effectiveness of invasive plant control and enhance the public land user's experience of an untrammeled wilderness.

Naturalness: Invasive plants in the wilderness arrive through vectors such as previous grazing activities and recreation use. Invasive plants may be controlled using the method or combination of methods known to be effective while causing the least damage to non-target species. A helicopter landing in the wilderness would not affect the naturalness characteristic, however it would bring in the weed strike team, during periods of high fire danger, who would then apply their treatment method, which would over time, reduce the annual growth rate of the infestation and encourage the natural distribution of native plants. Under the Proposed Action, native plant populations would have more protections.

Undeveloped: This quality is impaired by the use of motorized / mechanical transport that increases people's ability to occupy or modify the environment. Transporting weed strike teams into the wilderness using helicopter transport temporarily diminishes the undeveloped character of the wilderness. Treatment of invasive plants is a modification of the existing environment and reduces the undeveloped character. Remote sites in the wilderness where treatments are necessary have been inventoried, and repeat site visits are required to adequately treat the sites.

Solitude or Primitive and Unconfined types of Recreation: This quality is impaired by settings that reduce these opportunities, such as visitor encounters, signs of modern civilization, recreation facilities, and management restrictions on visitor behavior. Transporting weed strike teams into wilderness areas to control invasive plants could affect visitors who have chosen to recreate in the same wilderness area. Helicopters announce their presence by the loud distinctive noise they make when flying. BLM does not control the air space over wilderness; nonetheless, the sound of a helicopter, or its landing, could impair the solitude of a visitor who would expect to find no helicopters in their recreational wilderness experience.

Wilderness Study Areas

Effects to the qualities of *untrammeled, naturalness, undeveloped,* and *solitude or primitive and unconfined types of recreation* would be the same as for wilderness, except that helicopter landing is not proposed. Slowing the spread of invasive plants positively affects naturalness, because a wilderness "generally appears to have been

affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" (*Wilderness Act*). The Proposed Action would provide more protection to wilderness character than the No Action Alternative. ATV transport of herbicides may leave temporary tracks, and cutting woody species would leave small stumps, but no actions are proposed that would constrain future wilderness designation.

Wild and Scenic Rivers

Outstandingly Remarkable Values of the Wild and Scenic Rivers are closely related to wilderness characteristics. In general, requirements associated with protection of wilderness resources are more restrictive than those for Wild and Scenic Rivers with a Wild River classification. The protection of wilderness resources and character would provide adequate protection for Outstandingly Remarkable Values within most Wild and Scenic River corridors.

Redband Trout Reserve: Complete eradication of invasive plants is not feasible. Invasive plants growing on the banks of the Wild and Scenic Rivers compete with native plants that provide stream shading and reduce sediment transfer into the water. Over time, an increase in invasive plants could reduce stream shade cover and increase sediment transfer, which would affect water quality by raising water temperatures and increasing turbidity.

Both alternatives would provide some level of protection to the redband trout habitat; however, neither of the alternatives would entirely eliminate the existing invasive plant infestations. The alternatives would slow the growth of infestations, with the Proposed Action providing more protection for the fishery Outstandingly Remarkable Values then the No Action Alternative. See effects in the *Fish, Special Status Species (Aquatic), and Other Aquatic Resources* section in this Chapter for more information.

Vegetation and Botanical Outstandingly Remarkable Values: The diversity of plant communities in the Wild and Scenic River corridors are at risk of being affected by invasive plants. The alternatives would slow the growth of infestations, with the Proposed Action having the best chance of controlling infestations, encouraging a viable native vegetation population, and protecting the Outstandingly Remarkable Values. Targeted biological controls could be used if plant species suitable for that method presented themselves in the Wild and Scenic River corridors.

Lands with Wilderness Characteristics

As noted under Effects Common to all Special Management Areas above, better control of invasive plants would provide benefits to most resources within lands with wilderness characteristics. *Naturalness* would be better protected by the Proposed Action as invasive plants are prevented from displacing native plants and the ecosystems they support.

Outstanding opportunities for Solitude or an unconfined type of Recreation would benefit slightly from the Proposed Action when compared to the No Action Alternative, unless the area falls within one of the medusahead rye treatment units where aerial imazapic application may occur. Solitude could be adversely affected by the presence of treatment crews under both alternatives, but treatments would be more efficient under the Proposed Action (80 percent effective under the Proposed Action compared to 60 percent effective under the No Action Alternative), and thus treatments at a given site would be fewer.

Areas of Critical Environmental Concern

ACECs and RNAs are one of the treatment priority-setting criteria listed in Chapter 2, the special resources for which the ACECs and RNAs are designated are, by definition, worthy of extra effort to protect against the adverse effects of invasive plants. For that protection, the Proposed Action would be better since invasive plant control would be expected to be more effective than under the No Action Alternative. In addition, the additional

herbicides available under the Proposed Action make it more likely that an invasive plant control tool could be found that would simultaneously control the target plants while protecting adjacent ACEC / RNA resources.

A more detailed discussion of the potential impacts to vegetation, wildlife habitat, cultural plants, Special Status plants, wild horses, and so forth can be found in the resource sections in this Chapter, particularly those identified in Table 3-32, *Areas of Critical Environmental Concern and Research Natural Areas*, under *Primary Resource*.

Lands and Realty

Issues

- How would the alternatives affect rights-of-way and administrative site grants and leases?

Affected Environment

The Three Rivers Resource Area consists of public land blocks interspersed with private lands blocks of varying size. The Andrews / Steens Resource Area consists large areas of public lands with large private land holdings scattered through the area. Rural home sites and large blocks of State lands also occur throughout both resources areas.

Right-of-way grants and other land uses are recognized as major uses of the public lands and are authorized pursuant to sections 302 and 501 of the *Federal Land Policy and Management Act*. Section 503 of the *Federal Land Policy and Management Act* provides for the designation of rights-of-way corridors and encourages shared use of rights-of-way to minimize environmental impacts and the proliferation of separate right-of-way grants and leases.

Lands actions are generally considered reactive. The alternatives and / or outcomes are driven by the action requested, with requirements, including best management practices, written into the stipulations of the land agreements. These best management practices can vary widely in such a diverse and large area of land, and include invasive plant prevention and control.

There are 288 authorized and pending rights-of way on the Burns District, many of which are issued to private landowners for access to their land. The majority of these rights-of-way are issued to local and regional utilities including Harney Electric Cooperative, Oregon Trail Electric Cooperative, Oregon-Idaho Utilities, and Bonneville Power Administration. Harney County and the Oregon Department of Transportation also hold several rights-of-way for State highways, mineral materials pits, and County roads.

The authorized rights-of-way on the District also include leases on the three separate communication sites on the Burns District: Jack Mountain, Buckskin Mountain, and Wrights Point.

Treatments Planned Relating to the Issues

Common to Both Alternatives

Applications for rights-of-way will continue to be considered pursuant to existing policies and practices on a case-by-case basis. These rights-of-way will be considered with the following things in mind: identified transportation and utility corridors, identified avoidance and exclusion areas, and valid existing rights. Reasonable access to State or private land as well as access for utility or transportation services would be granted as necessary and reasonable given appropriate NEPA analysis. New and recently renewed grants and leases, requires the following:

- All earth-moving equipment used in connection with this right-of-way shall be thoroughly washed down and cleaned of all mud, dirt, and vegetative debris at a location acceptable to the Authorized Officer. Cleaning of equipment shall be accomplished immediately prior to initial mobilization and anytime the equipment is removed and returned to the road area.

- The holder shall be responsible for noxious weed prevention and control within the limits of the right-of-way when new surface disturbing activities on the right-of-way are proposed. Prior to undertaking any noxious weed prevention or control measures the holder shall consult with the BLM Authorized Officer regarding acceptable noxious weed control methods, monitoring, reporting, and education of personnel on noxious weed identification. Application of chemicals for control of noxious weeds or any other purpose shall be in accordance with applicable Federal and State law and shall be approved by BLM prior to application.

Though not a requirement of the grants and leases, the Burns District partners with the larger right-of-way holders on the District to effectively combat the invasive plant issues affecting everyone. Neither alternative would enable right-of-way holders to treat native vegetation for fire protection or any other purpose.

The BLM monitors invasive plants, even where noxious weeds are a grant holder's responsibility. BLM recommends treatment methods when infestations are detected, and in some cases, may cooperate with the right-of-way holder to conduct treatments. Newer right-of-way holders are required to notify the Authorized Office of their intent to use herbicides for guidance on acceptable treatments. Under the No Action Alternative, herbicide use on noxious weeds on BLM-administered lands would be restricted to four herbicides District-wide,[69] and the constraints adopted with the Oregon FEIS (USDI 2010b:12). Under the Proposed Action, right-of-way requirements would remain the same but ten additional herbicides would become available.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse vegetation management effects to lands and realty is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include, but are not limited to:

- Coordinate vegetation treatment activities where joint or multiple uses of a right-of-way exists.
- Use only herbicides that are approved for use in right-of-way areas.

Environmental Consequences

Effects by Alternative

Common to Both Alternatives

Under the Proposed Action and the No Action Alternative there would be no change to the current management of rights-of-way and no additional effects to those holding the grants or leases. Grants and leaseholders would continue to have responsibility for control and prevention of noxious weeds, although the BLM often recommends treatment methods when infestations are detected. In some cases, the BLM may cooperate with the right-of-way

[69] An additional four herbicides are available for use on invasive plants in limited areas on the District (see Table 2-7*, Summary of NEPA Covering the No Action Alternative*), including areas with rights-of-way and administrative site grants and leases under the No Action Alternative.

holder to conduct treatments. Right-of-way holders are monitored and required to use best management practices.

No Action Alternative

Grants and leaseholders' responsibilities would continue, but their ability to meet those responsibilities would continue to be restricted by having access to just four herbicides District-wide and four additional herbicides in limited areas (see Table 2-7*, Summary of NEPA Covering the No Action Alternative*). Grants and leaseholder employees and others using the rights-of-ways (e.g. ATV operators, horseback riders, hikers) may be exposed to herbicides used along the rights-of-way.

Proposed Action

Grant and leaseholder responsibility for control of noxious weeds would continue, but the additional ten herbicides could be used if allowed under the applicable grant or lease. Holders of long, linear rights-of-way would benefit by being able to use the same herbicides over long expanses rather than changing each time they enter BLM-administered lands. Where grants or leases specify or limit the herbicides to be used, there may be some delay in approving additional herbicides until grants or leases are renewed. Grants and leaseholder employees and others potentially exposed to herbicides used along the rights-of-way would potentially be less at risk, because the additional herbicides as a group have lower human toxicity than the four currently being used, and there would be more herbicides from which to choose the one that best fits the potential human exposure situation.

The addition of invasive plants to the species that can be controlled would enable right-of-way holders the opportunity to treat these species during right-of-way maintenance. For example, utilities would be able to treat invasive annual grasses, such as cheatgrass, around their structures with residual herbicides such as imazapic and sulfometuron methyl, lessening the threat of fire damage. However, grants and leases currently require control only of noxious weeds.

Emergency stabilization and invasive annual grass treatments (Categories 4 and 5) would be expected to remain the responsibility of the BLM unless otherwise described in NEPA documents and resulting grants and / or leases for major rights-of-way such as major transmission lines.

Right-of-way holders are accustomed to using the prescribed herbicides to manage invasive plants within the right-of-way grant area, as are leaseholders. As more effective herbicides become available to address the specific invasive plants of concern to right-of-way holders, their treatments would reduce the time and cost of treatments.

Cumulative Effects

Common to Both Alternatives

Additional herbicides (besides the 14 analyzed in this EA) are being used by Harney Electric Cooperative, Oregon Trail Electric Co-op, and Idaho Power Company in their rights-of-way to remove all vegetation around utility poles in fire-prone areas. These effects were analyzed in the EAs done for the Buzzard Fire Complex (USDI 2014c), the Miller Homestead Fire (USDI 2012b), and the Holloway Fire (USDI 2013b; see Table 2-7*, Summary of NEPA Covering the No Action Alternative*). A combination of bromacil and diuron (trade name Weed Blast) is used to treat a 15-foot radius around Harney Electric Cooperative utility poles crossing the Miller Homestead Fire and the Holloway Fire project areas. Weed Blast and a combination of tebuthiuron and diuron (trade name SpraKil SK-26) treat a 15-foot radius around Oregon Trail Electric Co-op (using Weed Blast) and Idaho Power Company (using SpraKil SK-26) utility poles crossing the Buzzard Fire Complex. These herbicides would have a cumulative beneficial effect for the right-of-way holder of inadvertently controlling undetected invasive plants in the treated areas, creating a relatively invasive plant-proof fire-free zone around poles (as opposed to using mechanical treatments (e.g.

plowing) to create fire-free zones), and slowing fire more than just the treatments of invasive plants would do. NEPA has been initiated to use these herbicides on Harney Electric Cooperative power poles District-wide.

Herbicide risks to human health of right-of-way holder personnel and right-of-way users like ATV riders could be slightly exacerbated by the diuron, tebuthiuron, and bromacil risks already present near these poles. However, because the estimated human risk ratings for the No Action and Proposed Action Alternatives are nearly the same, this potential cumulative effect is the same for both alternatives (see *Human Health and Safety* section for more information on human risk ratings).

Proposed Action

The use of additional herbicides to treat invasive plants under the Proposed Action has no adverse effects to rights-of-way and administrative site grants and leases. Beneficial effects include reduced invasive plant spread. In the reasonably foreseeable future, additional NEPA analysis would assess the impacts of the treatment of native vegetation with herbicides in rights-of-way.

These potential treatments would enable the right-of-way holders to simultaneously manage all vegetation with herbicides. As roadsides and other access corridors often serve as vectors for invasive plant spread, this would incidentally treat additional invasive plants that may have been undetected (USDI 2010a:136) and reduce the likelihood that non-herbicide methods of native plant treatments (e.g. mowing) are spreading undetected invasive plants down travel corridors (USDI 2010a:137).

Socioeconomics

Issues

- How would the alternatives affect adjacent agricultural activities, including organic farms or permittees certified organic?
- How would alternatives affect adjacent landowners?

Affected Environment[70]

The Burns District is located predominantly in Harney County, with smaller portions located within Malheur, Crook, and Lake Counties. The Federal government has a substantial social, economic, and environmental presence in the area; nearly 73 percent of the land in Harney County is Federal, with 59.2 percent managed by the BLM. In 2013, Harney County's population was 7,146 (US Census Bureau 2015b). This was a decrease of almost 4 percent since 2010, compared to a 2.5 percent increase in the State of Oregon population. It is one of the most sparsely populated counties in Oregon, with less than one person per square mile compared to about 40 persons per square mile statewide.

As described in the Lands and Realty chapter, the Burns District consists of large areas of public lands with large private land holdings scattered through the area. Rural home sites and large blocks of State lands also occur throughout both resources areas.

The Harney County economy differs somewhat from that of the State as a whole, with a lower proportion of jobs in the service sector (50 percent compared to 69 percent statewide) and a higher proportion of non-services

[70] Information in this section comes from the Oregon State University (OSU) Extension Service, The U.S. Census Bureau, and the Economic Profile System –Human Dimensions Toolkit (USU 2012, US Census Bureau 2015a, and EPS-HDT 2015)

related jobs (29 percent compared to 18 percent statewide). Of the non-services jobs, over half were in the farm sector, reflecting the continuing importance of farming and ranching activities in the local economy. In 2013, the percent of jobs in the farm sector (16.9 percent) was higher than any other private (non-governmental) sector of Harney County's economy. However, the percentage of employment in the farm sector decreased from 18 percent of employment since 2001.

Livestock raising and associated feed production industries are major contributors to the Harney County economy. The highest individual agricultural sales revenue in the County derived from cattle production (65 percent), which inextricably linked to the commodity value of public rangelands. The cattle industry provided $57,422,000 in sales in Harney County in 2012 compared to $54,533,000 in 2011 (Oregon State University Extension Service 2012). BLM actively communicates with several organic farms in Harney County in the Silvies Valley and Glass Butte areas.

The County has been experiencing drought conditions, which have an especially strong effect on agriculture and livestock operations. The Governor declared a drought in Harney, Lake and Malheur counties on February 13, 2014. On February 4, 2015, the U.S. Department of Agriculture designated 11 counties in Oregon as primary natural disaster areas due to damages and losses caused by a recent drought; farmers and ranchers in Harney, Lake, and Malheur counties qualify for natural disaster assistance.

Treatments Planned Relating to the Issues

Two socioeconomic issues were identified during scoping: the effects of the alternatives on adjacent private lands, in particular effects on organic farms. These issues overlap closely with those identified for invasive plants and livestock grazing. As a result, conclusions in those sections regarding environmental consequences are relevant to this section.

Existing Mitigation Measures require coordination with and notification to neighboring landowners, and require posting access points and notifying the public of planned herbicide treatments (see Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*). These measures help explain when treatments are planned and why a given treatment was selected. Various Standard Operating Procedures and Mitigation Measures also call for buffers to domestic water sources and notification of residents near planned herbicide use.

Organic farmers and ranchers would be expected to be especially susceptible to potential drift of herbicides because their products depend on very specific conditions and the absence of chemical herbicides. However, organic farms also are negatively affected by adjacent invasive plant infestations. Citizens of Harney County can obtain a "No Spray" permit issued by the State or County if they do not wish to have herbicides sprayed next to their property. These permits are not binding on the BLM; they are most commonly used to prevent State or County road maintenance spraying noxious weeds immediately adjacent to private properties, and these crews know where these permits have been issued. Currently only one County-issued permit is near BLM-administered lands on Rye Grass Lane. Other people put up such signs but do not obtain a permit; some are intended to protect high-value crops or other things not always apparent at the site. BLM spray crews would generally respect signs they see. Standard Operating Procedures preclude ground spraying within 100 feet of a residence, and ¼ mile for aerial application, without written permission from the owner. The District works with adjacent organic farms and permittees on a case-by-case basis to determine what treatments would be appropriate.

The *Livestock Grazing* section in Chapter 3 also reports that some grazing permit holders are seeking, or have, organic certification. There is a potential for invasive plant treatments to negatively affect these plans.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

The potential for adverse herbicide-related effects is minimized for both alternatives by existing Standard Operating Procedures and Mitigation Measures (see Appendix A). These include, but are not limited to:

- 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.
- Coordinate with and / or notify neighboring landowners who may want to treat, or are already treating, adjacent lands.
- 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.
- 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.
- 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, would include coordination with the Oregon Department of Environmental Quality and the municipality to whom the intake belongs.
- Consider surrounding land use before selecting aerial spraying as a treatment method, and avoid aerial spraying near agricultural or densely populated areas.
- 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.

Environmental Consequences

Effects of Treatment Methods

Common to Both Alternatives

The effects of the alternatives (including the use of herbicides) on adjacent private, County, State, and other Federal lands is a multifaceted issue. On one hand, there is a clear benefit to adjacent landowners, County, State, and other Federal lands resulting from the BLM having a broader range of herbicides available for consideration. Many scoping comments on the Oregon FEIS favored the BLM's ability to utilize a wider range of herbicides than the four currently available because it would better match those currently used on private, County, State, and other Federal lands.

On the other hand, there is a potential for drift onto adjacent lands with the potential to damage crops and other desirable vegetation, and to contaminate domestic water sources (see *Water Resources* section in this Chapter). Although having more herbicides available would allow the BLM to better choose herbicides that balance the control need with adjacent susceptible resources, the potential for herbicides to adversely affect organic farms and adjacent landowners is similar for both alternatives. Buffers applicable to different application methods, drift reducing adjuvants, and notifications all work to keep BLM herbicides on BLM-administered lands.

Having more herbicides available would also enhance the BLM's ability to prevent the spread of invasive plants from Federal lands to private, County, State, and other Federal lands, a major concern in an area where Federal

lands predominate and private lands support grazing and farming both with the potential to be seriously harmed by invasive plants. To many ranchers and other residents, it makes sense for the BLM to have more tools in the invasive plant-fighting kit to be able to choose the best treatment for a given piece of ground. The Oregon Department of Fish and Wildlife comment during scoping, for example, favored use of a broader spectrum of herbicides as long as they were considered as part of an integrated invasive plant and pest management program. The Oregon FEIS and other sections of this EA describe some of the benefits to resources of concern to people. A recent report described the significant existing negative economic impacts associated with invasive plants, the additional costs associated if invasive plants expand to new areas, and the positive return on investment associated with control (The Research Group 2014).

No Action Alternative

As described in other sections of this EA, the existing availability of the four herbicides and restriction to only noxious weed treatments[71] limits the BLM's ability to target specific infestations with the most cost-effective, least-risk treatment, when compared to the Proposed Action. Under this alternative, noxious weeds are expected to continue spreading at about 12 percent per year (USDI 2010a:133). In an area where farming is a significant land use and contributor to the local economy, and a strong aspect of the local culture and lifestyle, both the use of various pesticides and the control of invasive plants that negatively affect crops is a priority. Neighboring landowners expect the BLM to control its invasive plants and prevent their spread to private lands. In fact, State law gives the Oregon Department of Agriculture authority to control noxious weeds when landowners do not, and to bill the landowner for the costs. Therefore, the No Action Alternative has the potential to negatively affect adjacent private lands, including organic farms, by denying some treatments that would be more effective in limiting the spread of damaging invasive plants.

Adjacent landowner resources, and the landowners themselves, have the potential to be affected by the herbicides used in this Alternative. Risk Assessments indicate some risk to some resources (non-target plants and crops, livestock, human health) under some exposure scenarios. While Standard Operating Procedures and Mitigation Measures are designed to reduce that risk to negligible levels, continuing to limit use to four herbicides would result in a higher risk than would occur under the Proposed Action (see Appendix C, *Herbicide Risk Assessment Summaries)*. Further information can be found in other sections including *Human Health and Safety*.

Proposed Action

As described in other sections of this EA, the addition of 10 herbicides and the ability to treat both noxious weeds and other invasive plants would improve the BLM's ability to select the most cost-effective and lowest-risk treatment from within the integrated invasive plant management system. In many cases, the additional herbicides provide less environmental and human health risk than do the four existing herbicides, decreasing the risk to adjacent private landowners and their resources. For example, applications of 2,4-D are predicted to decrease 30 percent on the District (see Table 3-1, *Estimated Treatment Acres*) from the No Action Alternative to the Proposed Action. During scoping on the Oregon FEIS, County governments and others expressed frustration with the BLM's inability to use newer herbicides that would allow the Agency to more effectively participate in "geographically logical" invasive plant control efforts.

The BLM's ability to more closely match existing private land treatments on adjacent areas would be more effective than the No Action Alternative at meeting EA Purpose C. *Cooperatively control invasive plants so they do not infest or re-infest adjacent non-BLM-administered lands*. Under this alternative, invasive plant spread would be reduced to an estimated seven percent and infest 70,578 fewer acres in 15 years than under the No Action Alternative (see *Invasive Plant* section earlier in this Chapter). Harney County currently has a Cooperative Weed Management Area (CWMA) that works with landowners to identify and treat noxious weeds. The CWMA looks at

[71] The four herbicides, 2,4-D, dicamba, glyphosate, and picloram, are the only herbicides used on the District since a 1984 court injunction limited the number of herbicides available, and limited their use to noxious weeds.

the County as a whole, working on both private and public lands. The Proposed Action would be expected to allow the BLM to be a more effective partner with the CWMA and all their cooperators. Organic farms, like other adjacent lands, would benefit from reduced invasive plant populations on BLM-administered lands.

Implementation Costs

Issues

- How would the alternatives affect the cost of invasive plant control?

This section examines the direct costs of the No Action Alternative and the Proposed Action. Examined for each alternative are total direct costs and direct costs per effectively treated acre. Costs are arguably not a potential effect on the human environment and thus the section is not necessarily required by NEPA. However, in this case, it furthers NEPA objectives to display the factors that would be used by the decision-maker to select from among the alternatives, and cost-effectiveness is thus identified as a *Purpose* in Chapter 1. BLM planning policy specifies that management actions having a high likelihood of improving resource conditions for relatively small expenditures of time and money should receive relatively higher priority (USDI 2005a:34). This section helps furthers these decision-making objectives.

Treated Acres and Effectively Treated Acres, by Alternative

Treated Acres

An estimate of the total acres of invasive plants that would be treated over the 10 to 15 year life of the EA with each herbicide and each non-herbicide treatment method for both alternatives is presented in Table 3-1, *Estimated Treatment Acres*.

The costs presented in this section are in 2015 dollars. If funding were available, it would be desirable to treat all invasive plant sites analyzed in this EA as quickly as possible. However, it is likely that treatments described would take place over the next 10-15 years. Annual treatment levels could vary based on changes in program emphasis or priorities, fluctuations in budgets, opportunities for cost savings with partnerships, and the availability of external funding. Since project related actions might be implemented through cooperative agreements, multiple partners may bear these costs. State and local governments, adjacent land owners, Cooperative Weed Management Areas, interest groups, and permit holders would contribute to or fully fund some invasive plant treatments, especially where those parties own, or have interests in, a potentially affected area or development.

Effectively Treated Acres

Invasive plant control treatments are not 100 percent effective at controlling invasive plant populations on the first try. Under both alternatives, some level of retreatment would be necessary to achieve complete control. A five-acre treatment, for example, would be monitored to detect additional or remaining plants, and some portion of those acres would likely require retreatment. The amount of retreatment necessary is a function of how effective the prior treatment is.

“Effective” treatments for each alternative are the portion of the treatments that successfully control the invasive plants on the treated site and thus prevent future invasive plant spread. The percentage of treatments meeting this definition varies by alternative and is estimated to be 60 and 80 percent of the Category 1 invasive plant treatments for the No Action Alternative and the Proposed Action respectively (see Table 3-33)(USDI 2010a:136). It

is most appropriate to look at cost per effectively treated acres, because the overarching objective is to control invasive plants and prevent their spread.

Table 3-33. Estimated Acres of Invasive Plant Treatments, Category 1, by Alternative

Method	No Action Alternative	Proposed Action
Total Acres Treated over 10-15 years	44,491	48,994
Total Treated Effectively with 1st Treatment[1]	26,697 (60%)	39,115(80%)
Total Treated Effectively with 2nd Treatment	37,814 (85%)	47,034 (96%)
Total Treated Effectively with 3rd Treatment	41,822 (94%)	48,504 (99%)

1. See USDI 2010a: 136-137.

Costs by Treatment Method

Costs displayed here include equipment, materials (including herbicides), wages, and contract costs; they do not include program planning (e.g., NEPA) or overhead. The acreage-weighted averages of these estimates are shown in Table 3-34. Herbicide application costs were averaged even though the cost of the herbicides themselves varies. The potential difference of herbicide costs was not judged significant[72] to a reasonable comparison of the alternatives. The price of herbicides per acre can be found in Table 3-35.

Table 3-34. Average Direct Cost of Treatment, by Treatment Method, per Acre

Treatment Method	Estimated Cost per Acre[1]
Herbicide	
Spot treatment backpack / wiper	$728
Spot treatment - ATV / UTV mounted w / handgun	$222
Spot treatment - truck mounted w / handgun	$150
Spot treatment - cut stump	$300
Broadcast treatment - backpack	$728
Broadcast treatment - ATV / UTV boom	$222
Broadcast treatment - truck mounted	$76
Broadcast treatment - aerial	$45
Manual	
Hand pulling / grubbing / digging	$2000
Mechanical	
Chainsaw and leave trees in place	$50
Chainsaw, pile trees, and burn	$500
Weed whacker (around buildings / fences)	$500
Mowing (walk behind push mower)	$500
Fire	
Prescribed fire broadcast burning (depends on size)	$75
Biological	
Insect, Pathogen, and Nematode	$500
Targeted grazing[3]	$320

1. Estimated costs for fiscal year 2015. Includes a $25 / acre cost for herbicides, and does not include time for BLM specialists' Contracting Officer Representative or cost of government vehicle expenses.
2. Reported in cost per mile. For purposes of analysis, it is assumed that 1 mile = 1 acre.
3. Estimate taken from an Idaho Fish and Game leafy spurge project. Actual costs are unknown on the Burns District.

[72] Fluridone and hexazinone are both substantially more expensive per acre than the other 12 herbicides available under the Proposed Action Alternative. However, very little (if any) of each would be used overall.

Table 3-35. Cost of Herbicide Active Ingredients

Dark background indicates that the herbicide is available for use on noxious weeds district-wide under the No Action Alternative.
Light background indicates that the herbicide may be available for use on invasive plants in limited areas under the No Action Alternative (see EAs on Table 2-7 and Map 2-8).

All 14 herbicides are available for use district-wide on invasive plants under the Proposed Action.

Active Ingredient[1]	Price / Lb.	Typical Rate		Maximum Rate	
		Lbs. / Acre	Price / Acre	Lbs. / Acre	Price / Acre
2,4-D	$2.07	1	$2.07	1.9	$3.93
Chlorsulfuron	$519.23	0.047	$24.40	0.141	$73.21
Clopyralid	$26.24	0.35	$9.18	0.5	$13.12
Dicamba	$23.38	0.3	$7.01	2	$46.76
Dicamba + diflufenzopyr	65.00	0.2625	$17.06	0.4375	$28.44
Fluridone	$485	0.15	$72.75	1.3	$630.5
Glyphosate	$5.00	2	$10.00	7	$35.00
Hexazinone	$40.49	2	$80.97	4	$161.94
Imazapic	$78.75	0.0313	$2.46	0.1875	$14.78
Imazapyr	$49.08	0.45	$22.09	1.25	$61.35
Metsulfuron methyl	$363.12	0.03	$10.89	0.15	$54.47
Picloram	$39.37	0.35	$13.78	1	$39.37
Sulfometuron methyl	$52.38	0.14	$7.33	0.38	$19.90
Triclopyr	$23.17	1	$23.17	10	$231.70

Total Cost and Cost per Effectively Treated Acre by Alternative

The portion of the total treatment need that would be treated is predicted to increase under the Proposed Action. Reasons for this increase include:

- the additional herbicides provide tools to control invasive plants not presently treated or at least not treated effectively;
- the additional herbicides make control treatments more effective and therefore more treatments can be done within existing funding;
- additional cooperator and permit-holder funding sources become available as it becomes practical to effectively treat more species; and,
- approving herbicides currently used on adjacent non-BLM-administered lands would encourage cooperative weed management across ownerships.

Total costs increase as more acres are treated. However, the cost per effectively treated acre decreases as effectiveness increases (see Table 3-36). This decrease is wholly related to the increased efficiency of having more control tools available. It is assumed that treatments would be 60 percent effective under the No Action Alternative and 80 percent effective under the Proposed Action (see Table 3-33, *Estimated Acres of Invasive Plant Treatments, Category 1, by Alternative*)(USDI 2010a:136).

Table 3-36. Cost of Invasive Plant Treatments, Category 1, by Alternative

Method	No Action Alternative	Proposed Action
Non-Herbicide ($2,000 / acre)	$264,000	$264,000
Herbicide ($200 / acre)	$8,871,800	$9,772,400
Total cost	$9,135,800	$10,036,400
Cost per acre	$205.3	$204.8
Cost per acre effectively treated[1]	$262.6	$256.1

1. It is assumed that treatments would be 60 percent effective under the No Action Alternative and 80 percent effective under the Proposed Action (see Table 3-33)(USDI 2010a:136).

Effects by Alternative

No Action Alternative

Category 1 (Existing Documented Sites): The cost of implementing treatments for Category 1 would be $9,135,800 in 2015 dollars, or $205.3 an acre. Treatments are estimated to be 60 percent effective, so treatment cost per effectively treated acre is $262.6 (see Table 3-36).

Category 2 (Future Spread from Existing Sites): Under the No Action Alternative, invasive plants are estimated to spread 12 percent annually or 5,340 acres in the first year. Assuming that treatment methods and herbicides would be similar to sites in Category 1, the cost of implementing treatments for Category 2 would be $1,096,800 for the first year of spread. Treatment cost per effectively treated acre would continue to be $262.6, as under Category 1.

Category 3 (New Invaders): The cost of implementing treatments for Category 3 is unknown, but is likely to be minimal.

Categories 4 and 6 (Post fire emergency stabilization, and Low Priority Invasive Plants): These Categories are unlikely to be treated under the No Action Alternative, as there is no effective herbicide available to treat invasive annual grasses, nor are many invasive annual grass species listed as noxious. The cost of treating all acres currently identified as Category 5 (Invasive Annual Grasses) would be $52,800,000.

Proposed Action

Category 1 (Existing Documented Sites): The total cost of implementing treatments is slightly more than the No Action Alternative at $10,036,400 in 2015 dollars, but slightly less per acre at $204.8. Additional acres treated under the Proposed Action include invasive plants not listed as noxious weeds by the State or County. The price per treatment acre would drop because an herbicide selective to annual grasses would be available District-wide, and hence invasive annual grasses can be broadcast treated at a cheaper rate than spot treatments. In addition, increased effectiveness of treatment makes the treatment cost per effectively treated acre lower than the No Action Alternative at $256.1 (see Table 3-36, *Cost of Invasive Plant Treatments, Category 1, by Alternative*).

Category 2 (Future Spread from Existing Sites): Under the Proposed Action, the annual spread rate would, after 15 years, slow to 7 percent annually (see *Invasive Plants* section earlier in this Chapter). The first full year of treatments would have an annual spread rate of 9.8 percent, or 4,816 acres. Assuming that treatment methods and herbicides would be similar to sites in Category 1, the cost of implementing treatments for Category 2 would be $986,600 for the first year of spread. Treatments are estimated to be 80 percent effective (and treatment cost per effective acre would continue to be $256.1).

Category 3 (New Invaders): The cost of implementing treatments for Category 3 is unknown, but is likely to be minimal, as new invaders are found only a few times a year, and are often less than one acre when discovered. Fluridone, which costs more than 26 times as much at the typical rate as the average price of other herbicides available under the Proposed Action (see Table 3-35, *Cost of Herbicides*), may be used if an aquatic invasive plant is found on the District.

Category 4 (Post-fire emergency stabilization and rehabilitation): The cost of implementing treatments for Category 4 is unknown, but likely to be minimal to the Burns District integrated weed budget. Fires on the District burn an average of 47,902 acres annually. A portion of a late season fire burned area may need treatments of imazapic for emergency stabilization if it seems that the fire will be followed by heavy rain, and invasive annual grasses are competing with desired forbs. These treatments would be funded with post fire emergency stabilization budgets.

Category 5 (Invasive Annual Grasses): Assuming most treatments would be aerial broadcast herbicide treatments, with smaller amounts of truck-mounted broadcast treatments and targeted grazing, the total cost of treating the 817,500 acres of Category 5 would be $53,280,000 (average of $65 / acre).

Category 6 (Low Priority Invasive Plants): The cost of implementing treatments for Category 6 would be unknown since the District generally does not inventory. They are a low priority for treatment, based on their apparent lower level of threat to natural resources. Plants in this Category would not normally be treated except in conjunction with treatment of other plant species on the same site, or if they begin to threaten native ecosystems.

Non-Quantified Effects

Management of invasive plants affects the costs of managing BLM-administered lands. Increased operating costs due to invasive plant management may result in direct or indirect transfer of costs to land management programs or users of BLM-administered lands. Invasive plant management may compete with other important land management needs, resulting in cost tradeoffs. However, invasive plant treatments would result in improvements in the condition of BLM resources and would lead to increases in commodity and non-commodity values, improving the goods, services, and uses provided by BLM-administered lands. Treatments would increase the quantity and quality of wildlife forage, reduce fire hazard, and reduce other negative effects from invasive plant spread. Improved recreation opportunities and reductions in risk of wildfires, would benefit the economies of Harney County communities, which are dependent on recreational opportunities and other natural resource-based businesses.

Human Health and Safety

Issues

- What is the risk from possible exposure of the public to herbicides for each alternative?
- How would the alternatives affect worker safety?
- How would the use of helicopters for transporting affect worker safety?

Affected Environment

Background Health Risks

People living in Harney County are exposed to a variety of risks common to the U.S. as a whole, while the risks to workers may differ from those facing the public, depending on the nature of a person's work. Some of these risks may be quantified, but a lack of data allows for only a qualitative description of certain risks.

Risks from Injury and Diseases

Disease Incidence

Despite the difficulties in establishing correlations between work conditions and disease, only certain illnesses have been linked to occupational hazards in National and State-level studies. Occupational exposures to some metals, dusts, and trace elements, vegetation fire smoke, carbon monoxide, carbon disulfide, halogenated hydrocarbons, nitroglycerin, and nitrates can result in increased incidence of cardiovascular disease. Neurotoxic

disorders can arise from exposure to a wide range of chemicals, including some pesticides.[73] Dermatological conditions like contact dermatitis, infection, trauma, cancer, vitiligo, urticaria, and chloracne have a high occurrence in the agricultural, forestry, and fishing industries.

Injury and Disease Mortality

Occupational injury, illness, and fatality rates in Oregon (rates are not calculated by County) show the agriculture, forestry, hunting, and fishing industry to have some of highest injury rates (USBLS 2012a, b). Reportable injuries occurred at a rate of 3.45 per 100,000 hours worked, and fatalities occurred at a rate of 0.0063 per 100,000 hours worked (seven times the occupational rate overall).

Treatments Planned Relating to the Issues

Common to Both Alternatives

The full range of treatments envisioned under both of the alternatives bear on the issues identified for this section. The use of manual, mechanical, and both ground and aerial herbicide treatments all have the potential for injury to workers. In addition, the public may be exposed to herbicides because, in spite of posting known public concentration areas or tribal gathering areas, the public ultimately has access to all treated lands. The spread of invasive plants is primarily facilitated by public activities, so treatment areas necessarily correlate with public use areas including campgrounds, trailheads, roads, and stream corridors. However, where required by labels or where the BLM determines there would be a real or perceived risk to the public from an herbicide treatment, treatment areas are signed or closed to public access, and / or treatments are scheduled to avoid normal public use periods. Where the Human Health Risk Assessments (see Appendix C) for the 14 herbicides indicate a moderate or high risk to the public under modeled exposure scenarios, Mitigation Measures to reduce the risk have been adopted and made a part of the Alternatives (see Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*).

Under the Proposed Action, there is a wider range of herbicides from which an exposure is possible. In addition, there could be up to 100,000 additional acres of invasive annual grasses primarily treated per year with imazapic when compared with the No Action Alternative.

Standard Operating Procedures and Mitigation Measures Relevant to Effects

Standard Operating Procedures, PEIS Mitigation Measures, and Oregon FEIS Mitigation Measures designed to reduce potential unintended effects to human health are listed in Appendix A. Specific Standard Operating Procedures and Mitigation Measures pertinent to this analysis include:

- 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.
- 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.
- Use the typical application rate, where feasible, when applying 2,4-D, fluridone, hexazinone, and triclopyr[74] to reduce risk to workers and the public.

[73] Pesticides include insecticides, rodenticides, fungicides, herbicides, and other “pest” control materials.
[74] An Oregon FEIS Mitigation Measure stating, “do not apply triclopyr by any broadcast method” is not applied in this analysis because an updated Risk Assessment for triclopyr found zero risk for all worker and public exposure scenarios at the typical rate.

- 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.

Work practices are also dictated by Federal and State Occupational Safety and Health Administration rules, by Oregon Department of Agriculture rules, and by product labels. These work requirements include:

> When conducting treatments, workers would always wear appropriate safety equipment and clothing and use equipment that is properly maintained. For prescribed fire, workers would notify nearby residents who could be affected by smoke. Those involved in fire use treatments would maintain adequate safety buffers between the treatment area and residences / structures. For cutting vegetation, all brush and tree stumps would be cut flat, where possible, to eliminate sharp points that could injure a worker or the public. Spark arrestors would be required on all equipment to reduce the risk of accidental fire.
>
> Workers applying herbicides would minimize application areas where possible, establish appropriate (herbicide-specific) buffer zones, post treated areas with appropriate signs at common public access areas, and notify the public of the potential for exposure. The results from the Human Health Risk Assessments (see Appendix C, *Herbicide Risk Assessment Summaries*) help inform District personnel on the proper application of herbicides to ensure that effects to humans are minimized.

Additionally, the BLM requires that Risk Management Worksheets be completed for specific, potentially hazardous work activities. These worksheets address the hazard of specific work activities, identify the steps to be taken (such as the use of safety equipment, cleaning equipment, and so forth) to reduce the hazard where indicated, and identify responsibilities and monitoring to ensure those steps are taken. The Invasive Plant Management Program on the Burns District has current Risk Management Worksheets for *Herbicide Handling and Application, ATV / 6X6 Use, Driving Concerns, Environmental and Weather Risks,* and *Horseback Spraying or Packing of Herbicide.* These five worksheets are included in this EA in Appendix G.

Project Design Feature Adopted for this Analysis

- A Risk Management Worksheet for helicopter travel would be completed and identified Control Measures be implemented before using helicopters to land invasive plant control crews in the wilderness, or anywhere else this form of travel might need to be utilized.

Environmental Consequences

Effects of Treatment Methods to Human Health and Safety

Herbicide and Non-Herbicide Treatments

Manual, mechanical, and chemical treatments can present health hazards to workers. Hazards could include workers suffering hearing damage, falling objects (especially when cutting trees), tripping or slipping on hazards on the ground, protruding objects such as branches and twigs, poisonous plants and insects, and dangerous wildlife.

Adverse weather and terrain commonly create unfavorable working conditions and increased hazards. Hazards associated with adverse weather conditions include extreme heat and cold, which can be exacerbated by very dry and very wet conditions. Workers are subject to heat-related illness or hypothermia when working in extreme weather conditions, and may incur musculoskeletal injuries related to improper body mechanics.

Tools and equipment present inherent hazards, such as sharp edges, and the hazardous nature of petroleum used in mechanized equipment. Equipment operators could be injured from improperly operating the equipment or

losing control of equipment on steep or slippery terrain. Manual and mechanical methods present a potential for being struck by flying debris, ergonomic hazards related to lifting and carrying equipment, and when pulling vegetation. Members of the public are usually not at risk from manual and mechanical methods unless they are close to machinery that is producing flying debris during treatment.

Prescribed fire presents hazards from inhaling particulates. Studies have shown that fine particles are linked (alone or with other pollutants) to increased mortality and aggravation of preexisting respiratory and cardiovascular disease. Particulate matter can also affect immune systems (Ammann et al. 2001). Fatalities have been caused by prescribed fire (NIOSH 2009a).

Use of all-terrain vehicles (ATVs) for herbicide application and prescribed fire has also caused injuries and fatalities. In response to this, BLM has conducted research to evaluate the type of vehicle, load size, slope, and to establish policy and training to make ATV application safer (Morin 2008). This research has been used by Occupational Safety and Health Administration, the Consumer Product Safety Commission, and by the EPA to promulgate regulations for ATV use.

Use of helicopters in wilderness for the transport of herbicide and personnel increase the chances of injuries and fatalities. In response to the proposed use of helicopters to access one or more invasive plant sites in the wilderness, a Project Design Feature requiring that a current Risk Management Worksheet be completed and identified Control Measures be implemented before such flights is analyzed as part of the Proposed Action.

The potential for hazard exposure (risk of injuries) is exacerbated when workers are fatigued, poorly trained, poorly supervised, or do not follow established safety practices. Appropriate training, together with monitoring and intervention to correct unsafe practices, minimizes risk of worker injury and illness. Compliance with Occupational Safety and Health Administration standards, along with the Agency's Risk Assessments, industry, and manufacturers' recommendations reduces the potential exposure and risk of injury to workers

Herbicide Treatments

Appendix C (*Herbicide Risk Assessment Summaries*) presents summaries of the level of risk that workers and the public would face during the application of a given herbicide for the modeled exposure scenarios and for both maximum and typical application rate scenarios. For five of the 14 herbicides addressed in this EA, the Risk Tables show a measureable level of risk, either low, moderate, or high. These designations are for comparison purposes, and do not imply actual risks to people because Standard Operating Procedures, Mitigation Measures, and actual application and exposure scenarios would lessen exposures from Risk Assessment levels (see *Relationship of Effects to the Standard Operating Procedures and Mitigation Measures* near the beginning of this Chapter). Risk ratings and other information about those five herbicides are discussed below in Table 3-37, and the ratings are summarized in Table 3-38.

Table 3-37. Effects of Herbicides (Human Health)

Herbicides available under both alternatives	
2,4-D	Mitigation Measures (Appendix A) limit the use of 2,4-D to typical application rates, where feasible, and an Oregon Mitigation Measure says 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. At the typical and maximum (1.9 lb.) application rates, workers involved in backpack spray, boom spray, and aerial application face low risk from 2,4-D exposure. Workers also face moderate risk from wearing contaminated gloves for 1 hour and no risk from exposure to a spill on lower legs for one hour or from exposure to spill on the hands for one hour. Based on upper bound hazard quotients that exceed one, adverse health outcomes are possible for workers exposed repeatedly over a longer period. The public faces zero risk from all modeled scenarios except direct spray, child, entire body at maximum application rate poses a low risk. Other exposure scenarios to the public have no risk. Based on recent studies reviewed by SERA, 2,4-D is toxic to the immune system and developing immune system,

	especially when used in combination with other herbicides (tank mixes). The mechanism of action of 2,4-D toxicity is cell membrane disruption and cellular metabolic processes. 2,4-D toxicity affects human lymphocytes and nerve tissue. Therefore, interactions are likely to occur when 2,4-D is mixed with other chemicals that affect cell membranes and cell metabolism (SERA 2006). SERA (2006) suggests that 2,4-D may cause endocrine disruption in male workers applying large amounts of this herbicide; however, the study was inconclusive. Based on currently available toxicity information that demonstrate effects on the thyroid and gonads following exposure to 2,4-D, there are some data supporting its endocrine disruption potential and EPA is studying this further (EPA 2005). In the Human Health Risk Assessment conducted to support the reregistration of 2,4-D (EPA 2004), the EPA concluded that there is not sufficient evidence that 2,4-D is an endocrine disrupting chemical.
Glyphosate	For both workers and members of the public, there are no risks associated with nearly all exposures to glyphosate at the typical or maximum application rate (SERA 2011a). The Risk Assessment calculated no risk for all but one of the tested scenarios. There is low risk to children in the public associated with accidental exposure to glyphosate consumption of contaminated water after an herbicide spill at the maximum rate into a small pond.
Herbicides available under the Proposed Action	
Fluridone	Mitigation Measures (Appendix A) limit the use of fluridone to typical application rates, where feasible. Fluridone does not pose a risk to workers or the public when applied at the typical application rate. When fluridone is applied at the maximum application rate, there is low risk to mixer / loaders. For accidental scenarios, fluridone poses a low to high risk to all workers at typical and maximum rates respectively, and a low risk to children and resident publics at the maximum rate. Fluridone causes reversible eye irritation.
Hexazinone	Mitigation Measures (Appendix A) limit the use of hexazinone to typical application rates, where feasible, in addition to not allowing the application of hexazinone with an over-the-shoulder broadcast applicator. At maximum application rates, the three general exposure scenarios for workers, backpack, boom, and aerial, would pose a low risk (SERA 1997). Risk was zero for all modeled public exposure scenarios.
Triclopyr	Mitigation Measures (Appendix A) limit the use of triclopyr to typical application rates, where feasible. Workers face low risk from directed and broadcast ground spray and aerial applications at the upper ranges of exposures for both evaluated forms of triclopyr (triclopyr acid and triclopyr BEE) at the maximum application rate (SERA 2011d). At the maximum application rate for triclopyr BEE, workers face low risk from accidental exposure to contaminated gloves (1-hour duration). Thus, for workers who may apply triclopyr repeatedly over a period of several weeks or longer, it is important to ensure that work practices involve reasonably protective procedures to avoid the upper extremes of potential exposure. At higher application rates, measures that limit exposure should be developed on a case-by-case basis depending on the application rate and method. There is low risk to the public from triclopyr BEE applications at the maximum rate for under several acute or accidental scenarios: 1) direct spray to the lower legs; 2) dermal contact with contaminated vegetation; 4) acute consumption of contaminated fruit; and 4) acute consumption by a child of pond water contaminated by a spill. There is low risk to the public from triclopyr acid applications at the maximum rate for acute consumption by a child of pond water contaminated by a spill, and for chronic consumption of contaminated fruit.

Herbicide Risk Summary

Only two of the herbicides pose a measured risk to workers at the typical rate. Fluridone poses a low risk under one scenario, and 2,4-D poses a low risk under three worker scenarios (backpack spray, boom spray, and aerial application) and a moderate risk under one scenario, wearing contaminated gloves for an hour. None of the herbicides pose a risk to the public under any of the modeled scenarios including accidental spill at the typical rate (see Table 3-38).

At the maximum rate, four of the herbicides pose a risk to workers. These include fluridone (high risk for accidental spill, low risk for aerial mixer / loader), 2,4-D (low under three scenarios and high for contaminated gloves), hexazinone (low for three exposure scenarios), and triclopyr acid and BEE (low under three and four scenarios respectively). Four herbicides also pose a risk to the public at maximum rates. These are fluridone (two exposure scenarios), 2,4-D (one scenario, direct spray child, entire body), triclopyr acid and BEE (two and four scenarios respectively), and glyphosate (one scenario, consumption of pond water after an accidental spill). A Mitigation

Measures limits application of all of these herbicides except glyphosate to typical rate where feasible (see Table 3-38).

Table 3-38. Human Health Herbicide Risk Summary
(includes low and moderate risk scenarios for each herbicide)

Herbicide	Worker		Public		Category 1 or 5 Acres to be Treated in 10 to 15 years[1]	
	Typical rate	Maximum rate	Typical rate	Maximum rate	No Action Alternative	Proposed Action
Fluridone	L	H, L[2]	-	L, L[2]	-	0
2,4-D	L, L, L, M	L, L, L, M[2]	-	L[2]	18,852	18,226
Hexazinone	-	L, L, L[2]	-	-	-	500
Triclopyr acid	-	L, L, L[2]	-	L, L[2]	-	3
Triclopyr BEE	-	L, L, L, L[2]	-	L, L, L, L[2]		
Glyphosate	-	-	-	L	961	939

1. See Table 3-1, *Estimated Treatment Acres*
2. Limited by Mitigation Measure to typical rate where feasible.

Effects by Alternative

Common to Both Alternatives

Physical injuries from related to treating Category 1-3 sites, including vehicle travel, walking (tripping, falling), carrying backpacks or tools, ATV use, and applying herbicides, would be similar for both alternatives, since the level of treatments by all methods is expected to be similar under both alternatives. Manual pulling and cutting treatments, estimated for 131 of the 26,000 Category 1 acres (and likely a much higher percentage of new infestations under Categories 2 and 3), can be expected to add strains and cuts. All injury rates would be within agricultural industry norms.

Aerial applications of herbicides, particularly imazapic in Categories 4 and 5, poses an additional risk for aerial application contractors, and these risks would be proportional to the acres treated, or about three times higher for the Proposed Action than for the No Action Alternative. Aerial applicator injuries are included in the rates cited above for agricultural workers.

Herbicide risks are summarized by alternative below, but Standard Operating Procedures, application rates, personal safety equipment and practices, and other measures seek to prevent Risk Assessment-modeled exposure scenarios from occurring to the public or workers. No injuries to herbicide applicators from herbicide exposure have been recorded for at least the past ten years on BLM-administered lands in Oregon (Jeanne Standley, Oregon BLM State Weed Coordinator, pers. com.).

No Action Alternative

Because some invasive plants are treated with two herbicides at the same time (tank mix), an acres-by-herbicide summary of the herbicide portion of treatments on the 26,000 acres in Category 1 totals approximately 44,491 acres (See Table 3-1, *Estimated Treatment Acres*). About 18,850 of these acres would include 2,4-D either alone or in conjunction with one or more other herbicides in a tank mix. Almost of all of these treatments are planned for the typical rate (see Table 2-10, *Treatment Key*). There is no measured risk for any of the public exposure scenarios at this rate.[75] However, there are four worker exposure scenarios with low or moderate risk. When Standard Operating Procedures, Mitigation Measures, and handling policies and direction are followed, this herbicide poses

[75] In the case of tank mixes, risk ratings for both materials are considered, and mitigation for both are applied. Risks are not averaged. Herbicides are only used together when one or both are registered for use with the other and it is so stated on the product label.

little risk to workers. The acres planned for glyphosate treatments (over 10-15 years) is almost all below or near typical rate. Glyphosate poses a low risk under one public exposure scenario at the maximum rate

Exposure scenarios for 2,4-D at the maximum rate (see Table 3-38, *Human Health Herbicide Risk Summary*) are unlikely because a Mitigation Measure prohibits this rate where feasible. In addition, access to recreation and other concentrated public use sites may be restricted for a few hours or days, depending on the requirements of the herbicide label. During site closures, BLM posts signs noting the exclusion area and the duration of the exclusion. Standard Operating Procedures also require providing public notification in newspapers or other media where the potential exists for public exposure, and consulting 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.

Proposed Action

Injuries from manual treatments under this alternative can be expected to be the same as those under the No Action Alternative because the estimated acreage is the same.

As with the No Action Alternative, there are no public exposure risk scenarios for any of the 14 herbicides at the typical rate. Fluridone poses a low risk under one worker exposure scenario but no use is envisioned unless a new invasive aquatic species is discovered on the District. Worker 2,4-D exposure risks of low to moderate under four worker exposure scenarios remain under this alternative, but estimated treatment acres decrease slightly when compared to the No Action Alternative (see Table 3-38, *Human Health Herbicide Risk Summary*).

Up to 100,000 acres of annual grasses would be treated annually in Category 5, most of which would be imazapic and aerially applied. However, imazapic poses no public or worker risk under any of the exposure scenarios studied.

Exposure scenarios for fluridone, 2,4-D, hexazinone, and triclopyr acid and BEE (see Table 3-38, *Human Health Herbicide Risk Summary*) at the maximum rate are unlikely because Mitigation Measures prohibit this rate "where feasible." In addition, access to recreation and other concentrated public use sites may be restricted for a few hours or days, depending on the requirements of the herbicide label. During site closures, BLM posts signs noting the exclusion area and the duration of the exclusion. Standard Operating Procedures also require providing public notification in newspapers or other media where the potential exists for public exposure, and consulting with Native American tribes to locate any areas of vegetation that are of significance to the tribes that might be affected by herbicide treatments.

Cumulative Effects

The pounds of herbicide anticipated to be used under the No Action Alternative and Proposed Action represent about 7 and 11 percent, respectively, of the total pounds of herbicide estimated to be used in the Oregon Closed Basins portion of Oregon, essentially Lake and Harney Counties (see Table 3-2, *Pounds of Herbicides used in Oregon Closed Basins 2008, and BLM Current / Proposed Use*).[76] However, none of the 14 herbicides proposed for use are likely to persist, be blown, transported in water, or moved in soils in ways that would combine them with similar materials to increase human health risk. The Proposed Action would increase the pounds of herbicide used by 68 percent when compared with the No Action Alternative in spite of application acres being nearly tripled.[77] In addition, the acres to be treated with herbicides showing even low risks under one or more exposure scenarios decrease slightly under the Proposed Action when compared to the No Action Alternative. The newer herbicides

[76] The Burns District occupies 26 percent of the Oregon Closed Basins.
[77] As noted on Table 3-2, however, this reduction is primarily because the Proposed Action would add herbicides designed to be applied in ounces, rather than pounds, per acre. This reduction, by itself, does not necessarily mean less risk.

themselves pose less risk to the public and workers, and the increased number of herbicides available would facilitate the selection of a treatment most appropriate for the site and surrounding conditions.

The risk from herbicides is only partly cumulative to the risks from other management activities. If BLM personnel are applying herbicides, they are not cutting juniper, mowing invasive plants, or working with cattle. Traveling to and from the worksite has a higher (and cumulative) risk. The risk of helicopter uses has the pro and con of the employee's chance of injury or death. The pro side is the fast movement of personnel and equipment in and out of the different invasive plant sites, support of the weed crews if an incident (injuries) takes place, not having weed crews traveling for hours (horseback), not having them camp in the wilderness, and rapid removal of crews in case of wildfire. The con side is the increase of a chance of the helicopter having some type of an incident (failures, chemical spills within the helicopter, or leaving for other incidents), training of the weed crews to work with the helicopter, and getting the right type of helicopter to do the job. Without the helicopter, the travel time would increase by hours, increasing the chance of a horse-related injury to personnel, chance of spilling chemical on horse and the environment, increase the removal time for injured employees, and removal of the chance of helicopter failures and incidents. The analysis indicates risks to public are negligible, but such risks would be cumulative to the risks incurred from traveling to BLM-administered lands to recreate, and interacting with wildland resources, both of which carry a higher risk of injury or death. These latter are risks the public understands and accepts.

Glossary

Abiotic: Not involving living organisms.

Acetolactate synthase (ALS): A plant enzyme that facilitates the development of amino acids needed for plant growth.

Acetolactate synthase (ALS)-inhibitor: An herbicide that starves plants by reducing ALS. In this EIS, the ALS-inhibitors include three sulfonylureas (chlorsulfuron, metsulfuron methyl, and sulfometuron methyl) and two imidazolinones (imazapic and imazapyr).

Acid soil or acidic soil: A soil material having a pH of less than 7.0.

Active ingredient (a.i.): The ingredient in an herbicide that prevents, destroys, repels, desiccates, or otherwise controls the target plant.

Active preference: That portion of the total grazing preference for which grazing use may be authorized.

Acute effect: An adverse effect on any living organism in which symptoms develop rapidly and often subside after the exposure stops.

Acute toxicity: The quality or potential of a substance to cause injury or illness shortly after exposure through a single or short-term exposure.

Adjuvant: A chemical that is added to the pesticide formulation to enhance the toxicity of the active ingredient or to make the active ingredient easier to handle.

Adsorption: 1) The adhesion of substances to the surface of solids or liquids. 2) The attraction of ions of compounds to the surface of solids or liquids.

Affected environment: Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action.

Air pollutant: Any substance in the air that could, if in high enough concentration, harm humans, animals, vegetation, or material. Air pollutants may include almost any natural or artificial matter capable of being airborne in the form of solid particles, liquid droplets, gases, or a combination of these.

Air quality: The composition of air with respect to quantities of pollution therein. Used most frequently in connection with “standards” of maximum acceptable pollutant concentrations.

Allotment (grazing): Area designated for the use of a certain number and kind of livestock for a prescribed period of time.

Alluvial: Made up of or found in the materials that are left by the water of rivers, floods, etc.

Ambient air: Any unconfined portion of the atmosphere; open air, surrounding air, or “outdoor air.”

Anadromous fish: Fish that mature in the sea and swim up freshwater rivers and streams to spawn. Examples include salmon, steelhead, and sea-run cutthroat trout.

Anaerobic: Life or processes, such as the breakdown of organic contaminants by microorganisms, which take place without oxygen.

Area of critical environmental concern (ACEC): Type of special land use designation specified within the Federal Land Policy and Management Act. Used to protect areas with important resource values in need of special management.

Best management practices (BMPs): Manual-directed standard operating procedures and other standing direction, particularly when they apply to water.

Bioaccumulation: The process of a plant or animal selectively taking in or storing a persistent substance. Over time, a higher concentration of the substance is found in the organism than in the organism's environment.

Biological Assessment (BA): Information prepared by a Federal agency to determine whether a proposed action is likely to: (1) adversely affect listed species or designated critical habitat; (2) jeopardize the continued existence of species that are proposed for listing; or (3) adversely modify proposed critical habitat. Biological assessments must be prepared for "major construction activities" (50 CFR §402.02). A BA may also be recommended for other activities to ensure the agency's early involvement and increase the chances for resolution during informal consultation.

Biological control: The use of non-native agents including invertebrate parasites and predators (usually insects, mites, and nematodes), and plant pathogens to reduce populations of invasive plants.

Biological crust: Thin crust of living organisms on or just below the soil surface; composed of lichens, mosses, algae, fungi, cyanobacteria, and bacteria. Biological crusts are typically found in arid areas.

Boom (herbicide spray): A tubular metal device that conducts an herbicide mixture from a tank to a series of spray nozzles. Usually mounted to a truck, or behind a tractor or all-terrain vehicle.

Broadcast application: An application of an herbicide that uniformly covers an entire area.

Buffer: A solution or liquid whose chemical makeup is such that it minimizes changes in pH when acids or bases are added to it; a space or distance left between the application and a non-target area; a strip of vegetation that is left or managed to reduce the impact that a treatment or action on one area might have on another area.

Burn-down: Quickly stopping a plant's progress towards seed ripening.

Candidate species: Plants and animals for which the U.S. Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

Cell: A unique ecosystem type used in the Oregon Natural Heritage Plan to describe and evaluate natural areas. Cells contain one or more ecosystem elements.

Chronic exposure: Exposures that extend over a long period. Chronic exposure studies are used to evaluate the carcinogenic potential of chemicals and other long-term health effects.

Chronic toxicity: The ability of a substance or mixture of substances to cause harmful effects over an extended period, usually upon repeated or continuous exposure sometimes lasting for the entire life of the exposed organism

Clay: In soil, particles smaller than .002 mm in diameter.

Closed Basin- A basin draining to some depression or pond within its area, from which water is lost only by evaporation or percolation. A basin without a surface outlet for precipitation.

Consultation: Exchange of information and interactive discussion; usually refers to consultation mandated by statute or regulation that has prescribed parties, procedures, and timelines (e.g. Consultation under National Environmental Policy Act or Section 7 of the Endangered Species Act, or Consultation with tribes).

Control: Eradicating, suppressing, or reducing vegetation; a population that is not exposed to the potentially toxic agent in toxicology or epidemiology studies.

Cooperator: Leasees, permittees, and others with authorized uses or occupancy on BLM lands.

Critical habitat: 1) Specific areas within a species' habitat that are critically important to its life functions; an area designated by the FWS under rule-making as being critical to the needs of a federally listed species, and which then carries special protection and consultation requirements.

Cultural resources: Nonrenewable evidence of human occupation or activity as seen in any area, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature, which was important in human history at the national, state, or local level.

Cumulative effect: The effects that results from identified actions when they are added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Degradates: Compounds resulting from degradation.

Targeted grazing: The careful application of grazing or browsing prescriptions (i.e., specified grazing intensities, seasons, frequencies, livestock species, and degrees of selectivity) to achieve natural resource objectives. Livestock production is a secondary or nonobjective when using prescribed grazing as a natural resource management tool.

Dispersant: A type of inert ingredient added to an herbicide formulation that reduces the cohesive attraction between like particles.

Drift: That part of a sprayed herbicide that is moved from the target area by wind while it is still airborne.

Ecological amplitude: The limits of environmental conditions within which an organism can live and function.

Ecological Site Inventory (ESI): The ecological site inventory method involves the use of soils information to map ecological sites and plant communities and the collection of natural resource and vegetation attributes.

Effect: Environmental change resulting from a proposed action. Direct effects are caused by the action and occur at the same time and place, while indirect effects are caused by the action but are later in time, further removed in distance, or secondary. Effect and impact are synonymous as used in this document.

Endangered species: Any species listed under the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range.

Endangered Species Act (ESA): A law passed in 1973 to conserve species of wildlife and plants determined by the Director of the Fish and Wildlife Service or the NOAA Fisheries to be endangered or threatened with extinction in all or a significant portion of its range. Among other measures, ESA requires all federal agencies to conserve these

species and consult with the Fish and Wildlife Service or NOAA Fisheries on federal actions that may affect these species or their designated critical habitat.

Endocrine: Referring to several glands in higher animals that secrete hormones.

Entisol: A soil developed in unconsolidated parent material with usually no genetic layers except in topsoil.

Environmental assessment (EA): A concise public document that serves to document an examination of the potential environmental effects of a proposed project, and from that, examination documents whether to prepare an environmental impact statement or a finding of no significant impact.

Environmental justice: Equal protection from environmental hazards for individuals, groups, or communities regardless of race, ethnicity, or economic status. This applies to the development, implementation, and enforcement of environmental laws, regulations, and policies, and implies that no population of people should be forced to shoulder a disproportionate share of negative environmental impacts of pollution or environmental hazard due to a lack of political or economic strength.

Ephemeral stream: A stream that contain running water only sporadically, such as during and following storm events.

Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents.

Eutrophication: Excessive nutrients in a lake or other body of water, usually caused by runoff of nutrients (animal waste, fertilizers, sewage) from the land, which causes a dense growth of plant life; the decomposition of the plants depletes the supply of oxygen, leading to the death of animal life.

Fate: The course of an applied herbicide in an ecosystem or biological system, including metabolism, microbial degradation, leaching, and photodecomposition.

Federal Land Policy and Management Act of 1976 (FLPMA): Public Law 94-579. October 21, 1976, often referred to as the BLM' s "Organic Act," which provides the majority of the BLM's legislated authority, direction, policy, and basic management guidance.

Federally listed: Species listed as threatened or endangered under the Endangered Species Act.

Fire return interval: The average time between fires in a given area.

Forb: Small broad-leafed plant; broad-leaved herb other than a grass, especially one growing in a field, prairie, or meadow.

Formulation: The commercial mixture of an herbicide that includes both the active and inactive (inert) ingredients.

Fungi: Molds, mildews, yeasts, mushrooms, and puffballs, a group of organisms that lack chlorophyll and therefore are not photosynthetic.

Goal: A broad statement of a desired outcome. Goals are usually not quantifiable and may not have established time frames for achievement.

Good water quality: water that contains needed substances and where pollutants are not present**.**

Graminoid: Grasses (family *Gramineae* or *Poaceae*) and grass like plants such as sedges (family *Cyperaceae*) and rushes (family *Juncaceae*).

Gravel: In soil, particle sizes between 2 and 64 mm in diameter.

Green-stripping is the practice of establishing or using patterns of fire resilient vegetation and/or material to reduce wildfire occurrence and size

Gross infested area or treatment area: An area of land occupied by one or more invasive plant species; the area of land defined by drawing a line around the general perimeter of the infestation, not the canopy cover of the plants; the gross area of a logical treatment unit. May contain significant parcels of land that are not occupied by the weed.

Groundwater: Subsurface water that is in the zone of saturation; the top surface of the groundwater is the "water table"; source of water for wells, seeps, and springs.

Groundwater contaminant: Chemical detected in ground waters. Does not necessarily infer levels are toxic or harmful.

Habitat: The natural environment of a plant or animal, including all biotic, climatic, and soil conditions, or other environmental influences affecting living conditions; the place where an organism lives.

Half-life: The amount of time required for half of a compound to degrade.

Hazard quotient (HQ): The ratio of the estimated level of exposure to a substance from a specific substance from a specific pesticide application to the reference dose (RfD) for that substance, or to some other index of acceptable exposure or toxicity. An HQ less than or equal to 1 is presumed to indicate an acceptably low level of risk for that specific application. Analogous to BLM risk quotient.

Herbicide: A pesticide used to control, suppress, or kill vegetation, or severely interrupt normal growth processes.

Herbicide resistance: Naturally occurring heritable characteristics that allow individual weeds to survive and reproduce, producing a population, over time, in which the majority of the plants of the weed species have the resistant characteristics.

Hard water: Water that contains a high concentration of calcium and magnesium ions.

Herd Management Area: Public land under the jurisdiction of the BLM that has been designated the maintenance of an established wild horse and burro herd.

Hydrologic: The properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Infested: An area having one or more of the subject invasive species – either plants or plant pathogens. Infested areas are not necessarily 100 percent infested.

Inholder: A person holding title to lands surrounded by BLM lands or a special designation such as wilderness.

Integrated vegetation / weed management (IVM / IWM): A long-standing, science-based, decision-making process that identifies and reduces risks from vegetation and vegetation management related strategies. It coordinates the use of vegetation biology, environmental information, and available technology to prevent unacceptable levels of damage by the most economical means, while posing the least possible risk to people, property, resources, and the environment. IVM provides an effective strategy for managing vegetation in all arenas from developed agricultural, residential, and public areas to wild lands. IVM serves as an umbrella to provide an

effective, all encompassing, low-risk approach to manage problem vegetation. A sustainable approach to managing vegetation by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks.

Interagency Special Status/Sensitive Species Program (ISSSSP): The BLM and FS shared program to coordinate record keeping and other management of the Bureau Special Status and Forest Service Sensitive species programs. Also, see *special status species*.

Intermittent stream: Any non-permanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

Invasive plants: A non-native aggressive plants with the potential to cause significant damage to native ecosystems and/or cause significant economic losses. *This Oregon EIS definition differs from the PEIS definition by not including species native to the ecosystem under consideration.*

Issue: A matter of controversy, dispute, or general concern over resource management activities or land uses.

K_{oc}: Organic carbon-water partition coefficient.

Label: All printed material attached to or part of the pesticide container, and which contains instructions for the legal application of the pesticide.

LC_{50} (median lethal concentration): A concentration of a chemical in air or water to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

LD_{50} (median lethal dose): The dose of a chemical calculated to cause death in 50% of a defined experimental animal population over a specified observation period. The observation period is typically 14 days.

Leaching: The movement of chemicals through the soil by water; may also refer to the movement of herbicides out of leaves, stems, or roots into the air or soil.

Lek: An area where male sage-grouse display during the breeding season to attract females (also referred to as strutting-ground).

Level of concern (LOC): The concentration or other estimate of exposure above which there may be effects.

Listed species: Formally listed as a threatened or endangered species under the ESA. Designations are made by the FWS or NMFS.

Lowest observed adverse effect level (LOAEL): The lowest dose of a chemical in a study, or group of studies, that produces statistically or biologically significant increases in frequency or severity of adverse effects between the exposed and control populations.

Marsh: A type of wetland that does not accumulate appreciable peat deposits and is dominated by herbaceous vegetation. Marshes may be either fresh or saltwater, tidal or nontidal.

Material safety data sheet (MSDS): A compilation of information required under the Occupational Safety and Health Administration Communication Standard on the identity of hazardous chemicals, health and physical hazards, exposure limits, and precautions.

Maximum application rate: The maximum application rate included on the label of the formulated product. For example, Plateau, the formulated product that has imazapic as its active ingredient, the label states that no more than 12.0 fluid ounces of product are to be applied on a per acre basis. According to the label there are two pounds of imazapic acid equivalent in a gallon of formulated product, so the maximum amount of active ingredient that may be applied is 0.1875 lb. a.i./acre.

Mechanical control: The use of any mechanized approach to control or eliminate invasive plants (i.e. mowing, weed whipping, or cutting with a chainsaw).

Mitigation: Actions that would: 1) avoid an impact altogether by not taking a certain action or parts of an action; 2) minimize an impact by limiting the degree or magnitude of the action and its implementation; 3) rectify an impact by repairing, rehabilitating, or restoring the affected environment; 4) reduce or eliminate an impact over time by preserving and maintaining operations during the life of the action; and, 5) compensate for an impact by replacing or providing substitute resources or environments.

Monitoring: The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives.

Nematode: Any of a phylum (*Nematoda* or *Nemata*) of elongated cylindrical worms parasitic in animals or plants or free-living in soil or water —called also roundworm.

No Action Alternative: The most likely condition to exist in the future if current management direction were to continue unchanged.

No observed adverse effect level (NOAEL): The exposure level at which there are no statistically or biological significant differences in the frequency or severity of any adverse effect between the exposed and control populations.

No observed effect level (NOEL): Exposure level at which there are no statistically or biological significant differences in the frequency or severity of any effect between the exposed and control populations.

Non-selective herbicide: An herbicide that is generally toxic to plants without regard to species or group.

Non-target: Any organism that is not the objective of a control treatment.

Noxious weed: A subset of invasive plants that are County, State, or federally listed as injurious to public health, agriculture, recreation, wildlife, or any public or private property.

Parent material: The unconsolidated and more or less chemically weathered mineral or organic matter from which the soil has developed by pedogenic processes.

Particulate matter (PM): A complex mixture consisting of varying combinations of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These tiny particles vary greatly in shape, size, and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust.

Pathogen: Any disease-producing agent, especially a virus, bacterium, or other microorganism.

Perched aquifer: an aquifer that occurs above the regional water table. This occurs when there is an impermeable layer above the main water table /aquifer but below the surface of the land

Perennial: A plant with a life cycle lasting more than two years; a stream that flows year round.

Persistence: The length of time a compound, once introduced into the environment, stays there.

Pesticide: Any substance used for controlling, preventing, destroying, repelling, or mitigating any pest. Includes fungicides, herbicides, fumigants, insecticides, nematicides, rodenticides, desiccants, defoliants, plant growth regulators, and so forth. Any material used in this manner is a pesticide and must be registered as such, even if it has other non-pesticide uses.

pH: A measure of how acidic or alkaline (basic) a solution is on a scale of 0 to 14 with 0 being very acidic, 14 being very alkaline, and 7 being neutral. The abbreviation stands for the potential of hydrogen.

Photo degradation: The photochemical transformation of a molecule into lower molecular weight fragments, usually in an oxidation process. This term is widely used in the destruction (oxidation) of pollutants by ultraviolet-based processes.

Playas: Flat land surfaces underlain by fine sediment or evaporate minerals deposited from a shallow lake on the floor of a topographic depression.

Post-emergent (herbicide): Herbicide used to kill weeds after they have germinated and are growing.

Pre-emergent (herbicide): A soil applied herbicide used to keep seeds from germinating.

Preliminary Priority Management Area: Areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-Grouse populations. These areas include breeding, late broodrearing, and known winter concentration areas (*The Oregon Greater Sage-Grouse Draft Resource Management Plan Amendment and Environmental Impact Statement* referred to this same area as preliminary priority habitat).

Prescribed fire: A wildland fire that burns under specified conditions and in predetermined area, to produce the fire behavior and fire characteristics required to attain resource management objectives.

Prevention: To detect and ameliorate conditions that cause or favor the introduction, establishment, or spread of invasive organisms or conditions.

Propagule: A part of a plant, e.g. a bud, spore, or root fragment, capable of producing a new plant.

Proper functioning condition: The condition of riparian and wetland areas when adequate vegetation, landform, or large woody debris are present to dissipate stream energy associated with high water flows. This reduces erosion and improves water quality; filters sediment, captures bedload, and aids in floodplain development; improves floodwater retention and groundwater recharge; develops root masses that stabilize streambacks against cutting; develops diverse ponding and channel characteristics to provide habitat and water depth, duration, and temperature necessary for fish production, avian breeding habitat, and other uses; and supports greater biodiversity.

Proposed threatened or endangered species: Plant or animal species proposed by the U.S. Fish & Wildlife Service to be biologically appropriate for listing as threatened or endangered and that is published in the Federal Register. It is not a final designation. Proposed species are, at minimum, managed as Bureau Sensitive until a decision is made about federal listing.

Rangeland: Land on which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs; not forests.

Research natural areas (RNAs): Parts of a national network of reserved areas under various ownerships, containing important ecological and scientific values and are managed for minimum human disturbance. They are

established and managed to protect ecological processes, conserve biological diversity, and provide opportunities for observation for research and education.

Resident fish: Fish that spend their entire life in freshwater (e.g., bull trout) on or near a specific location.

Residue: Herbicide or its metabolites remaining in or on soil, water, plants, animals, or surfaces.

Resource Management Plan (RMP): Current generation of land use plans developed by BLM under the FLPMA; replaces the older generation management framework plans; provides long-term (up to 20 years) direction for the management of a particular area of land, usually corresponding to a BLM resource area, and its resources.

Revegetation: Establishing or re-establishing desirable plants where desirable plants are absent or of inadequate density, either by controlling site conditions (including the suppression of unwanted competition) so existing vegetation can reseed and spread, or by direct seeding or transplanting.

Right-of-way (ROW): A permit or an easement that authorizes the use of lands for certain specified purposes, such as the construction of forest access roads, gas pipelines, or power lines.

Riparian area (from Oregon FEIS): Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables, and soils that exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs, and wet meadows.

Riparian buffer: A strip of vegetation planted along the bank of a body of water which slows the rate of flow of runoff from adjoining uplands, causing sediment and other materials to fall out onto the land before the runoff enters and pollutes the body of water.

Riparian habitat: Areas adjacent to rivers and streams with a high density, diversity, and productivity of plant and animal species relative to nearby uplands.

Riparian rights: Entitlement of a land owner to certain uses of water on or bordering his property, including the right to prevent diversion or misuse of upstream waters. Generally a matter of state law.

Risk: The likelihood that a given exposure to an item or substance (e.g. herbicide dose) will produce illness or injury.

Risk Assessment: The process of gathering data and making assumptions to estimate short- and long-term harmful effects to human health or elements of the environment from particular products or activities. See Appendix 8.

Risk quotient (RQ): The Estimated Environmental Concentration (EEC), as calculated through computer modeling, divided by the LD_{50} (lethal dose where 50% of test population dies) or LC_{50} (lethal concentration for aquatic forms, where 50% of the test population dies). RQs were developed to provide a more realistic scenario of herbicide exposure. Even so, results assume 100 percent exposure and animals confined to the treatment area. For species that are at all mobile, such exposures are unlikely from the applications proposed by the action alternatives. Analogous to Hazard Quotient. An RQ less than or equal to 1 is presumed to indicate an acceptably low level of risk for a specific application.

Runoff: Overland flow; that part of precipitation, as well as any other flow contributions that does not soak into soil or stay held on the site for evaporation or transpiration, but runs into streams.

Salmonids: Fishes of the family *Salmonidae*, including salmon, trout, chars, whitefish, ciscoes, and grayling.

Sand: In soil, particles 0.05 to 2 mm in diameter.

Satellite populations: Small populations spatially separated from other existing populations.

Scoping: A process at the beginning of a NEPA analysis whereby the public is asked to provide oral or written comments about the scope of the analysis and the range of alternatives, to help ensure the analysis appropriately addresses potential effects on individuals, communities, and the environment.

Sediments: Unweathered geologic materials generally laid down by or within water bodies; the rocks, sand, mud, silt, and clay at the bottom and along the edge of lakes, streams, and oceans.

Selective herbicide: A chemical designed to affect only certain groups or types of plants, leaving other tolerant plants unharmed.

Sensitive species (Bureau Sensitive): Native species designated by the state director as sensitive because they are found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either: 1. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range, or 2. The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

Significant: The description of an impact that exceeds a certain threshold level. Requires consideration of both context and intensity. The significance of an action must be analyzed in several contexts, such as society as a whole, and the affected region, interests, and locality. Intensity refers to the severity of effects, which should be weighed along with the likelihood of its occurrence. Determination of significance for effects is a management decision considering multiple factors, and not one made by technical specialists to indicate the quantity of effects are above or below some level.

Silt: In soil, particles between 0.002 and 0.05 mm in diameter.

Site-specific: At the site, area, or project level.

Socioeconomic: Pertaining to, or signifying the combination or interaction of social and economic factors.

Sodic: Sodic soils are characterized by a disproportionately high concentration of sodium (Na) in their cation exchange complex. They are usually defined as containing an exchangeable sodium percentage greater than 15%.

Special Status species: Federally listed threatened, endangered, proposed, or candidate species, and species managed as sensitive species by the BLM.

Spot treatment: An application of an herbicide to a small selected area such as an individual plant, as opposed to a broadcast application.

Standard Operating Procedures (SOPs): Procedures that would be followed by the BLM to ensure that risks to human health and the environment from treatment actions were kept to a minimum. See Appendix A. Since they originate from Manual and other direction, they may appear in resource management and other plans under other titles. SOPs specific to water are often referred to as best management practices (BMPs).

Subsistence: Customary and traditional uses of wild renewable resources (plants and animals) for food, shelter, fuel, clothing, tools, etc.

Sulfonylurea: A group of herbicides that interfere with interfere with acetolactate synthase, an enzyme needed for plant cell growth.

Surfactant: A material that improves the emulsifying, dispersing, spreading, wetting, droplet size, or other surface-modifying properties of liquids.

Tank mixture: The mixture of two or more compatible herbicides in a spray tank in order to apply them simultaneously.

Target species: A species (in this EA, a plant species) that is a target or goal of a treatment or control effort.

Targeted grazing: The carefully controlled grazing of livestock to accomplish specific vegetation management objectives. Unlike conventional grazing management, livestock are used as a tool for improving land health by performing weed control, reducing wildland fire, and aiding in restoration projects.

Threatened species: A plant or animal species federally listed as *threatened* under the Endangered Species Act, and status defined as likely to become an endangered species throughout all or a significant portion of its range within the foreseeable future.

Total preference: The total number of animal units of livestock grazing on public lands, apportioned and attached to base property owned or controlled by a permittee of lessee. The active preference and suspended preference are combined to make up the total grazing preference.

Traditional use areas (Native American plant gathering): Areas where tribes continue to gather plant materials for food, basketry, and other traditional uses. These may or may not be treaty reserved rights and/or areas.

Treaty resources: Resources for which one or more tribes have treaty rights. An exhaustive list does not exist, because American Indian tribes maintain confidentiality for names of medicines or spiritual plants and other natural resources.

Treaty rights: Tribal rights or interests reserved in treaties, by American Indian tribes for the use and benefit of their members. The uses include such activities as described in the respective treaty document. Only Congress may abolish or modify treaties or treaty rights.

Tribe: Term used to designate any American Indian band, nation, or other organized group or community, which is recognized as eligible for the special programs and services provided by the U.S. to American Indians because of their status as Indians.

Typical rate or typical application rate: One of two application rates considered in many Risk Analyses (the other being Maximum Rate); a rate based upon a general summary of actual applications that have been made of the different formulations of a particular active ingredient on BLM lands. Under some situations, this value may be higher or lower than what is going to be applied for a specific job. The rate of application of any pesticide is based upon several factors, including, but not limited to, the species to be controlled, the environment for which the application is to be made, the timing of the application, and other factors. For example, a typical rate of application for imazapic is about 2.0 fluid ounces of Plateau, which, when taking into the concentration of the formulated product (2.0 pounds acid equivalent/per gallon) equates to 0.0313 lb. a.e./acre. It is known that 2.0 fluid ounces of Plateau will achieve a specific level of control under a specific set of conditions. Rates around 4.0 to 6.0 fluid ounces of imazapic appear to be the more common range for activity, based on the experience of researchers, for

downy brome. The rate is based upon what is identified as what is normally considered for application under a normal condition. See *Background for Effects Analysis* in Chapter 3 for table of amounts of a.e./acre.

Uncertainty factor: A multiplier used in risk assessments to compensate for unknown risks due to limitations in the research.

Volatilization: The conversion of a solid or liquid into a gas or vapor; evaporation of herbicide before they are bound to a plant or ground.

Weed: When not preceded by "noxious," this term generally means invasive plants (including noxious weeds) in this EA. Its use in this EA is avoided except when it is used in citations and paraphrases of other documents, or is part of titles or common phrases. Within such documents, the intent is usually noxious weeds and other invasive plants.

Wetlands: An area that is saturated by surface or ground water with vegetation adapted for life under those soil conditions, as swamps, bogs, fens, marshes, and estuaries.

Wild and Scenic Rivers: Rivers designated in the National Wild and Scenic Rivers System that are classified in one of three categories (wild, scenic, or recreational), depending on the extent of development and accessibility along each section. In addition to being free flowing, these rivers and their immediate environments must possess at least one outstandingly remarkable value: scenic, recreational, geologic, fish and wildlife, historical, cultural, or other similar values.

Wilderness: Land designated by Congress as a component of the National Wilderness Preservation System. Characteristics qualifying an area for wilderness are: 1) naturalness - lands that are natural and primarily affected by the forces of nature; 2) roadless and having at least 5,000 acres of contiguous public lands; and 3) outstanding opportunities for solitude or primitive and unconfined, non-motorized types of recreation. In addition, areas may contain "supplemental values," consisting of ecological, geological, or other features of scientific, educational, scenic, or historical importance.

Wilderness Study Area – A roadless area or island under the jurisdiction of the BLM that has been inventoried and found to have wilderness characteristics as described in Section 2(c) of the Wilderness Act of 1964 (78 Stat. 891) and is currently in an interim management status awaiting official wilderness designation or release from further wilderness study by Congress.

Wildfire: An unwanted wildland fire.

Wildland fires: Fires occurring on wildlands, regardless of ignition source, damages, or benefits, and including wildfire and prescribed fire.

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Consultation and Coordination

The EA has been made available for a 30-day comment period.

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Review Opportunity

The EA and FONSI have been made available for a 30-day review period (May 2015) on BLM's website. A legal notice was also published in the Burns Times Herald announcing the availability of the documents for review and the comment period end date. Agencies, Native American Tribes, permittees/grant holders/leasees, and interested members of the public were notified of the availability of the EA and FONSI for review. This mailing list is contained in the project record file.

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).

Project Design Features

The following project design features were included in the analysis of this EA.

Fish and Other Aquatic Species

- For waterbodies that contain Federally Threatened or Endangered fish species or provide Critical Habitat, all Project Design Criteria outlined in the Aquatic Restoration Biological Opinion II (ARBO II) from the U.S. Fish and Wildlife Service would be applied. See Appendix F.

Recreation

- Avoid treatments where conflicts with special recreation activities could occur, such as aerial herbicide application in the vicinity of active big horn sheep hunts.

Wildlife

- Where domestic sheep or goat grazing is proposed, follow *Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat*, Western Association of Fish and Wildlife Agencies, 2010 (or its future equivalent) for determining appropriate separation. Standards call for site-specific evaluations when domestic sheep and goats are proposed within 20 miles of wild sheep.

Native American Interests and Uses

- At least one month prior to beginning annual treatments, the Annual Treatment Plan will be presented to the affected tribes along with an offer to consult on the Plan. Maps of known invasive plant infestations can also be shared with the tribes at this time.

- Where coordination with a tribe about an Annual Treatment Plan identifies areas where herbicide use would not be consistent with cultural values and uses, alternatives will be implemented where feasible, consistent with existing law, regulation, and policy.
- An existing mitigation measure requires that "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…" (see Appendix A, *Project Design Features, Standard Operating Procedures, Mitigation Measures, Conservation Measures, Prevention Measures, and Best Management Practices*). Similar posting for any herbicide use can be made in traditional gathering areas identified by the tribes. Coordination following receipt of the Annual Treatment Plan will help identify where such posting will occur.
- An infestation map or database can be supplied to the tribes any time, and will be supplied with the Annual Treatment Plan. Discussions about the implications of infestations, treatment and coordination ideas and options, possible effects and conflicts relating to those infestations, and related topics would be welcome as part of coordination with the tribes.

Wild Horses and Burros

- Minimize activities to limit unintentional movements of wild horses, especially repeated movement of horse herds within the same day.
- Avoid or minimize treatment techniques during peak foaling season (March 1 - May 31).
- Minimize potential adverse impacts to wild horse and burro habitat when using targeted grazing as a vegetation control measure where it is likely to result in removal or physical damage to vegetation that provides a critical source of food or cover.

Human Health and Safety

- A Risk Management Worksheet for helicopter travel will be completed and identified Control Measures be implemented before using helicopters to land invasive plant control crews in the wilderness or anywhere else this form of travel might need to be utilized.

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.[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 (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

[1] 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.

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.

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

Fire Use

BLM handbooks H-9211-1 (*Fire Management Activity Planning Procedures*) and H-9214-1 (*Prescribed Fire Management*), and manuals 1112 (*Safety*), 9210 (*Fire Management*), 9211 (*Fire Planning*), 9214 (*Prescribed Fire*), and 9215 (*Fire Training and Qualifications*).

Mechanical

BLM Handbook H-5000-1 (*Public Domain Forest Management*), and manuals 1112 (*Safety*) and 9015 (*Integrated Weed Management*).

Manual

BLM Domain Forest Management, and manuals 1112 (Safety), and 9015 (Integrated Weed Management).

Biological

BLM manuals 1112 (*Safety*), 4100 (*Grazing Administration*), 9014 (*Use of Biological Control Agents on Public Lands*), and 9015 (*Integrated Weed Management)* and Handbook H-4400-1 (*Rangeland Health Standards*).

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

Fire Use

- Prepare fire management plan.
- Use trained personnel with adequate equipment.
- Minimize frequent burning in arid environments.
- Avoid burning herbicide-treated vegetation for at least 6 months.

Mechanical

- Ensure that power cutting tools have approved spark arresters.
- Ensure that crews have proper fire-suppression tools during the fire season.
- Wash vehicles and equipment before leaving weed infested areas to avoid infecting weed-free areas.
- Keep equipment in good operating condition.

Manual

- Ensure that crews have proper fire-suppression tools during fire season.
- Minimize soil disturbance, which may encourage new weeds to develop.

Biological

- Use only biological control agents that have been tested and approved to ensure they are host specific.
- If using domestic animals, select sites with weeds that are palatable and non-toxic to the animals.
- Manage the intensity and duration of containment by domestic animals to minimize overutilization of desirable plant species.
- Utilize domestic animals to contain the target species in the treatment areas prior to weed seed set. Or if seed set has occurred, do not move the domestic animals to uninfested areas for a period of 7 days.

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

Fire Use
- Carefully plan fires in the WUI to avoid or minimize loss of structures and property.
- Notify nearby residents and landowners who could be affected by smoke intrusions or other fire effects.

Mechanical
- Collaborate on project development with nearby landowners and agencies.

Manual
- Collaborate on project development with nearby landowners and agencies.

Biological
- Notify nearby residents and landowners who could be affected by biological control agents.

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).

Fire Use
- Have clear smoke management objectives.
- Evaluate weather conditions, including wind speed and atmospheric stability, to predict effects of burn and impacts from smoke.
- Burn when weather conditions favor rapid combustion and dispersion.
- Burn under favorable moisture conditions.
- Use backfires, when applicable.
- Burn small vegetation blocks, when appropriate.
- Manage smoke to prevent air quality violations and minimize impacts to smoke-sensitive areas.
- Coordinate with air pollution and fire control officials, and obtain all applicable smoke management permits, to ensure that burn plans comply with federal, state, and local regulations.

Mechanical
- Maintain equipment in optimal working order.
- Conduct treatment activities during the wetter seasons.
- Use heavy equipment under adequate soil moisture conditions to minimize soil erosion.
- Minimize vehicle speeds on unpaved roads.
- Minimize dust impacts to the extent practicable.

Manual
- Maintain equipment in optimal working order.
- Conduct treatment activities during the wetter seasons.
- Minimize vehicle speeds on unpaved roads.
- Minimize dust impacts to the extent practicable.

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.

Fire Use
- Prescribe broadcast and other burns that are consistent with soil management activities.
- Plan burns so as to minimize damage to soil resources.
- Conduct burns when moisture content of large fuels, surface organic matter, and soil is high to limit the amount of heat penetration into lower soil surfaces and protect surface organic matter.
- Time treatments to encourage rapid recovery of vegetation.
- Further facilitate revegetation by seeding or planting following treatment.
- When appropriate, reseed following burning to re- introduce species, or to convert a site to a less flammable plant association, rather than to specifically minimize erosion.

Mechanical
- Time treatments to avoid intense rainstorms.
- Time treatments to encourage rapid recovery of vegetation.
- Further facilitate revegetation by seeding or planting following treatment.
- Use equipment that minimizes soil disturbance and compaction.
- Minimize use of heavy equipment on slopes >20%.
- Conduct treatments when the ground is sufficiently dry to support heavy equipment.
- Implement erosion control measures in areas where heavy equipment use occurs.
- Minimize disturbances to biological soil crusts (e.g., by timing treatments when crusts are moist).
- Reinoculate biological crust organisms to aid in their recovery, if possible.
- Conduct mechanical treatments along topographic contours to minimize runoff and erosion.
- When appropriate, leave plant debris on site to retain moisture, supply nutrients, and reduce erosion.
- Consider chaining when soils are frozen and plants are brittle to minimize soil disturbance.

Manual
- Time treatments to avoid intense rainstorms.
- Time treatments to encourage rapid recovery of vegetation.
- Further facilitate revegetation by seeding or planting following treatment.
- Minimize soil disturbance and compaction.
- Minimize disturbance to biological soil crusts (e.g., by timing treatments when crusts are moist).
- Reinoculate biological crust organisms to aid in their recovery, if possible.

- When appropriate, leave plant debris on site to retain moisture, supply nutrients, and reduce erosion.
- Prevent oil and gas spills to minimize damage to soil.

Biological

- Minimize use of domestic animals if removal of vegetation may cause significant soil erosion or impact biological soil crusts.
- Closely monitor timing and intensity of biological control with domestic animals.
- Avoid grazing on wet soil to minimize compaction and shearing.

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).

Fire Use

- Prescribe burns that are consistent with water management objectives.
- Plan burns to minimize negative impacts to water resources.
- Minimize burning on hillslopes, or revegetate hillslopes shortly after burning.
- Maintain a vegetated buffer between treatment areas and water bodies.

Mechanical

- Minimize removal of desirable vegetation near residential and domestic water sources.
- Do not wash equipment or vehicles in water bodies.
- Maintain minimum 25- foot wide vegetated buffer near streams and wetlands.

Manual

- Maintain vegetated buffer near residential and domestic water sources.
- Minimize removal of desirable vegetation near residential and domestic water sources.
- Minimize removal of desirable vegetation near water bodies.
- Minimize use of domestic animals near residential or domestic water sources.
- Minimize use of domestic animals adjacent to water bodies if trampling or other activities are likely to cause soil erosion or impact water quality.

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

Fire Use

- Following treatment, reseed or replant with native vegetation if the native plant community cannot recover and occupy the site sufficiently.

Mechanical

- Manage riparian areas to provide adequate shade, sediment control, bank stability, and recruitment of wood into stream channels.
- Following treatment, reseed or replant with native vegetation if the native plant community cannot recover and occupy the site sufficiently.

Manual

- Following treatment, reseed or replant with native vegetation if the native plant community cannot recover and occupy the site sufficiently.

Biological
- Manage animals to prevent overgrazing and minimize damage to wetlands.
- Following treatment, reseed or replant with native vegetation if the native plant community cannot recover and occupy the site sufficiently.

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).

Fire Use
- Keep fires as small as possible to meet the treatment objectives.
- Conduct low intensity burns to minimize adverse impacts to large vegetation.
- Limit area cleared for fire breaks and clearings to reduce potential for weed infestations.
- Where appropriate, use mechanical treatments to prepare forests for the reintroduction of fire.
- 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, including the application of state or regional grazing administration guidelines, needed to maintain desirable vegetation on the treatment site.
- Use plant stock or seed from the same seed zone and from sites of similar elevation when conducting revegetation activities.

Mechanical
- Power wash vehicles and equipment to prevent the introduction and spread of weed and exotic species.
- Remove damaged trees and treat woody residue to limit subsequent mortality by bark beetles.
- Use plant stock or seed from the same seed zone and from sites of similar elevation when conducting revegetation 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, including the application of state or regional grazing administration guidelines, needed to maintain desirable vegetation on the treatment site.

Manual
- Remove damaged trees and treat woody residue to limit subsequent mortality by bark beetles.
- 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, including the application of state or regional grazing administration guidelines, needed to maintain desirable vegetation on the treatment site.
- Use plant stock or seed from the same seed zone and from sites of similar elevation when conducting revegetation activities.

Biological
- Use domestic animals at the time they are most likely to damage invasive species.
- Manage animals to prevent overgrazing and minimize damage to sensitive areas.
- 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, including the application of state or regional grazing administration guidelines, needed to maintain desirable vegetation on the treatment site.
- Use plant stock or seed from the same seed zone and from sites of similar elevation when conducting revegetation activities.

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)
- Do not apply sulfometuron methyl aerially. (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)

Fire Use

- Maintain vegetated buffers near fish-bearing streams to minimize soil erosion and soil runoff into streams.

- Minimize treatments near fish-bearing streams during periods when fish are in sensitive life stages (e.g., embryo).

Mechanical

- Minimize treatments adjacent to fish-bearing waters.
- Do not wash vehicles in streams or wetlands.
- Refuel and service equipment at least 100 feet from water bodies to reduce the chance for pollutants to enter water.
- Maintain adequate vegetated buffer between treatment area and water body to reduce the potential for sediments and other pollutants to enter the water body.

Manual

- Refuel and service equipment at least 100 feet from water bodies to reduce the chance for pollutants to enter water.
- Minimize removal of desirable vegetation near fish-bearing streams and wetlands.

Biological

- Limit access of domestic animals to streams and other water bodies to minimize sediments entering water and potential for damage to fish habitat.

Chemical

- Use appropriate buffer zones based on label and risk assessment guidance.
- Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments.
- Use appropriate application equipment/method near water bodies if the potential for off-site drift exists.
- For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to meet vegetation management objectives, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
- Limit the use of terrestrial herbicides in watersheds with characteristics suitable for potential surface runoff that have fish-bearing streams during periods when fish are in life stages most sensitive to the herbicide(s) used. (MM)
- To protect Special Status fish and other aquatic organisms, implement all conservation measures for aquatic animals presented in the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment (see Appendix 5). (MM)
- Establish appropriate herbicide-specific buffer zones for water bodies, habitats, or fish or other aquatic species of interest (Tables A-3 and A-4, and recommendations in individual ERAs). (MM)
- Consider the proximity of application areas to salmonid habitat and the possible effects of herbicides on riparian and aquatic vegetation. Maintain appropriate buffer zones around salmonid-bearing streams. (MM)
- At the local level, consider effects to Special Status fish and other aquatic organisms when designing treatment programs. (MM)
- Use of adjuvants with limited toxicity and low volumes is recommended for applications near aquatic habitats. (Oregon FEIS MM)

Wildlife Resources

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

Fire Use

- Minimize treatments during nesting and other important periods for birds and other wildlife.
- Minimize treatments of important forage areas immediately prior to important use period(s), unless the burn is designed to stimulate forage growth.

Mechanical

- Minimize treatments during nesting and other important periods for birds and other wildlife.
- Retain wildlife trees and other unique habitat features where practical.

Manual

- Minimize treatments during nesting and other important periods for birds and other wildlife.
- Retain wildlife trees and other unique habitat features where practical.

Biological

- Minimize the use of livestock grazing as a vegetation control measure where and/or when it could impact nesting and/or other important periods for birds and other wildlife.
- Consider and minimize potential adverse impacts to wildlife habitat and minimize the use of livestock grazing as a vegetation control measure where it is likely to result in removal or physical damage to vegetation that provides a critical source of food or cover for wildlife.

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)

Threatened and Endangered Species

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

Fire Use

- Survey for Special Status species of concern if project may impact federally- and state-listed species.
- Minimize direct impacts to species of concern, unless studies show that species will benefit from fire.

Mechanical

- Minimize use of ground- disturbing equipment near Special Status species of concern.
- Survey for species of concern if project could impact these species.
- Use temporary roads when long-term access is not required.

Manual

- Survey for Special Status species of concern if project could impact these species.

Biological

- Survey for Special Status species of concern if project could impact these species.

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).

Fire Use

- Notify permittees of proposed treatments and identify any needed livestock grazing, feeding, or slaughter restrictions.
- Design treatments to take advantage of normal livestock grazing rest periods, when possible, and minimize impacts to livestock grazing permits.
- Provide alternative forage sites for livestock, if possible.
- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.

Mechanical

- Notify permittees of proposed treatments and identify any needed livestock grazing, feeding, or slaughter restrictions.
- Design treatments to take advantage of normal livestock grazing rest periods, when possible, and minimize impacts to livestock grazing permits.
- Provide alternative forage sites for livestock, if possible.
- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.

Manual

- Notify permittees of proposed treatments and identify any needed livestock grazing, feeding, or slaughter restrictions.
- Design treatments to take advantage of normal livestock grazing rest periods, when possible, and minimize impacts to livestock grazing permits.
- Provide alternative forage sites for livestock, if possible.
- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.

Biological
- Notify permittees of proposed treatments and identify any needed livestock grazing, feeding, or slaughter restrictions.
- Design treatments to take advantage of normal livestock grazing rest periods, when possible, and minimize impacts to livestock grazing permits.
- Provide alternative forage sites for livestock, if possible.
- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.

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)

Wild Horses and Burros

General
- Avoid critical periods and minimize impacts to critical habitat that could adversely affect wild horse or burro populations[2].

Fire Use
- Minimize potential hazards to horses and burros by ensuring adequate escape opportunities.

Chemical
- Minimize using herbicides in areas grazed by wild horses and burros.
- Use herbicides of low toxicity to wild horses and burros, where feasible.
- Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock.
- Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
- Minimize potential risks to wild horses and burros by applying glyphosate, hexazinone, and triclopyr at the typical application rate, where feasible, in areas associated with wild horse and burro use. (MM)

[2] A project design feature adopted by the Burns District clarifies this to "Avoid or minimize treatment techniques during peak foaling season (March 1 - May 31)."

- Consider the size of the application area when making applications of 2,4-D, dicamba, Overdrive®, picloram, and triclopyr in order to reduce potential impacts to wild horses and burros. (MM)
- Apply herbicide label grazing restrictions for livestock to herbicide treatment areas that support populations of wild horses and burros. (MM)
- Where practical, limit glyphosate and hexazinone to spot applications in rangeland. (MM)
- Do not apply 2,4-D in HMAs during peak foaling season. (MM)
- Do not exceed the typical application rate of Overdrive® or hexazinone in HMAs during the peak foaling season in areas where foaling is known to take place. (MM)
- Where there is a potential for wild horse or burro consumption of treated vegetation, apply dicamba, imazapyr, and metsulfuron methyl at the typical, rather than maximum, application rate to minimize risks. (Oregon FEIS MM)
- Do not broadcast spray 2,4-D, clopyralid, diflufenzopyr + dicamba, glyphosate, hexazinone, picloram, or triclopyr where wild horses have unrestricted access to treated areas, or reduce risks to wild horses from these herbicides by herding wild horses out of treatment areas. (Oregon FEIS MM)
- To limit adverse effects to wild horses and burros, particularly through the contamination of food items, treatments should not exceed 15 percent of any Herd Management Area at any given time. (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).

General

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and affected tribes.
- Follow BLM Handbook H-8270-1 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.

Fire Use

- Identify cultural resource types at risk from fire use and design inventories that are sufficient to locate these resources. Provide measures to minimize impacts.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Monitor significant paleontological and cultural resources for potential looting of materials where they have been exposed by fire.

Mechanical

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and interested tribes.
- Follow BLM Handbook H-8270-1 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.

- Identify cultural resource types at risk from mechanical treatments and design inventories that are sufficient to locate these resources. Provide measures to minimize impacts.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected, adversely or beneficially, by mechanical treatments.

Manual

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and interested tribes.
- Follow BLM Handbook H-8270-1 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.
- Identify cultural resource types at risk from manual treatments and design inventories that are sufficient to locate these resources. Provide measures to minimize impacts.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected, adversely or beneficially, by manual treatments.

Biological

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and interested tribes.
- Follow BLM Handbook H-8270-1 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.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected, adversely or beneficially, by biological treatments.

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).

Fire Use

- Minimize use of fire in sensitive watersheds to reduce the creation of large areas of browned vegetation.
- Consider the surrounding land use before assigning fire as a treatment method.
- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Avoid use of fire near agricultural or densely populated areas, where feasible.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, texture of the natural landscape conditions to meet established Visual Resource Management (VRM) objectives.

Mechanical

- Minimize dust drift, especially near recreational or other public use areas.
- Minimize loss of desirable vegetation near high public use areas.
- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Minimize earthwork and locate away from prominent topographic features.
- Revegetate treated sites.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established VRM objectives.

Manual

- Minimize dust drift, especially near recreational or other public use areas.
- Minimize loss of desirable vegetation near high public use areas.
- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established VRM objectives.

Biological

- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, and texture of the natural landscape character

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.

Fire Use

- Minimize soil-disturbing activities during fire control or prescribed fire activities.
- Revegetate sites with native species if there is no reasonable expectation of natural regeneration.
- Maintain adequate buffers for Wild and Scenic Rivers.

Mechanical

- Use the least intrusive methods possible to achieve objectives, and use non-motorized equipment in wilderness and off existing routes in wilderness study areas, and where possible in other areas.
- If mechanized equipment is required, use the minimum amount of equipment needed.
- Time the work for weekdays or off-season.
- Require shut down of work before evening if work is located near campsites.
- If aircraft are used, plan flight paths to minimize impacts on visitors and wildlife.
- Revegetate sites with native species if there is no reasonable expectation of natural regeneration.
- Maintain adequate buffers for Wild and Scenic Rivers.

Manual

- Use the least intrusive methods possible to achieve objectives, and use non-motorized equipment in wilderness and off existing routes in wilderness study areas, and where possible in other areas.
- Revegetate sites with native species if there is no reasonable expectation of natural regeneration.
- Maintain adequate buffers for Wild and Scenic Rivers.

Biological

- Use the least intrusive methods possible to achieve objectives, and use non-motorized equipment in wilderness and off existing routes in wilderness study areas, and where possible in other areas.
- Maintain adequate buffers for Wild and Scenic Rivers.

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).

Fire Use

- Control public access to potential burn areas.
- Schedule treatments to avoid peak recreational use times, unless treatments must be timed during peak times to maximize effectiveness.
- Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas.

Mechanical

- Control public access until potential treatment hazards no longer exist.
- Schedule treatments to avoid peak recreational use times, unless treatments must be timed during peak times to maximize effectiveness.
- Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas.

Manual

- Control public access until potential treatment hazards no longer exist.
- Schedule treatments to avoid peak recreational use times, unless treatments must be timed during peak times to maximize effectiveness.
- Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas.

Biological

- Control public access in areas with control agents to ensure that agents are effective.
- Schedule treatments to avoid peak recreational use times, unless treatments must be timed during peak times to maximize effectiveness.
- Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas.

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

Fire Use

- Post treatment areas.
- Notify adjacent landowners, grazing permittees, the public, and emergency personnel of treatments.
- Control public access to treatment areas.
- Consult with Native American tribes and Alaska Natives whose health and economies might be affected by the project.
- To the extent feasible, hire local contractors and purchase supplies locally.

Mechanical

- Post treatment areas.

- Notify adjacent landowners, grazing permittees, the public, and emergency personnel of treatments.
- Control public access to treatment areas.
- Consult with Native American tribes and Alaska Natives whose health and economies might be affected by the project.
- To the extent feasible, hire local contractors and purchase supplies locally.

Manual

- Post treatment areas.
- Notify adjacent landowners, grazing permittees, the public, and emergency personnel of treatments.
- Control public access to treatment areas.
- Consult with Native American tribes and Alaska Natives whose health and economies might be affected by the project.
- To the extent feasible, hire local contractors and purchase supplies locally.

Biological

- Post treatment areas.
- Notify adjacent landowners, grazing permittees, the public, and emergency personnel of treatments.
- Control public access to treatment areas.
- Consult with Native American tribes and Alaska Natives whose health and economies might be affected by the project.
- To the extent feasible, hire local contractors and purchase supplies locally.

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

Fire Use
- Coordinate vegetation management activities where joint or multiple use of a ROW exists.
- Notify other public land users within or adjacent to the ROW proposed for treatment.
- Manage burns under powerlines so as to avoid negative impacts to the powerline.

Mechanical
- Coordinate vegetation management activities where joint or multiple use of a ROW exists.
- Notify other public land users within or adjacent to the ROW proposed for treatment.
- Apply appropriate safety measures when operating equipment within utility ROW corridors.
- Minimize exposed soil areas during treatment.
- Keep operations within prescribed ROW.

Manual
- Coordinate vegetation management activities where joint or multiple use of a ROW exists.
- Notify other public land users within or adjacent to the ROW proposed for treatment.
- Always use appropriate safety equipment and operating procedures.
- Utilize methods for disposal of vegetation that prevent spreading or reinfestation of unwanted vegetation.

Biological
- Coordinate vegetation management activities where joint or multiple use of a ROW exists.
- Notify other public land users within or adjacent to the ROW proposed for treatment.

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

Fire Use
- Use some form of pretreatment, such as mechanical or manual treatment, in areas where fire cannot be safely introduced because of hazardous fuel buildup.
- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.
- Notify nearby residents who could be affected by smoke.
- Maintain adequate safety buffers between treatment area and residences/structures.
- Burn vegetation debris off ROWs to ensure that smoke does not provide a conductive path from the transmission line or electrical equipment to the ground.

Mechanical
- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.
- Cut all brush and tree stumps flat, where possible, to eliminate sharp points that could injure a worker or the public.
- Ensure that only qualified personnel cut trees near powerlines.

Manual
- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.
- Cut all brush and tree stumps flat, where possible, to eliminate sharp points that could injure a worker or the public.

Biological
- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.

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)
- Do not apply sulfometuron methyl aerially. (MM)
- Limit application of chlorsulfuron via ground broadcast applications at the maximum application rate. (MM)
- Do not apply hexazinone with an over-the-shoulder broadcast applicator (backpack sprayer). (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).
- Do not apply triclopyr by any broadcast method (Oregon FEIS MM). (This mitigation measure is not applied in this analysis because an updated Risk Assessment for triclopyr found zero risk for all worker and public exposure scenarios at the typical rate.)

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

Application Scenario	Chlorsulfuron	Fluridone	Imazapic	Overdrive	Sulfometuron methyl
Buffer Distance (feet) from Non-target Aquatic Plants					
Typical Application Rate					
Aerial	0	NE	0	NA	1,300
Low Boom[2]	0	NE	0	IOO	900
High Boom[2]	0	NE	0	900	900
Maximum Application Rate					
Aerial	300	NE	300	NA	1,500
Low Boom[2]	0	NE	0	900	900
High Boom[2]	0	NE	0	900	900
Buffer Distance (feet) from Non-target Terrestrial Plants					
Typical Application Rate					
Aerial	1,350	NE	0	NA	0
Low Boom[2]	900	NE	0	0	0
High Boom[2]	900	NE	0	100	0

Application Scenario	Chlorsulfuron	Fluridone	Imazapic	Overdrive	Sulfometuron methyl
Maximum Application Rate					
Aerial	1,350	NE	900	NA	0
Low Boom[2]	1,000	NE	0	100	0
High Boom[2]	1,000	NE	0	100	0
Buffer Distance (feet) from Threatened, Endangered, and Sensitive Plants					
Typical Application Rate					
Aerial	1,400	NE	0	NA	1,500
Low Boom[2]	1,000	NE	0	100	1,100
High Boom[2]	1,000	NE	0	900	1,000
Maximum Application Rate					
Aerial	1,400	NE	900	NA	1,500
Low Boom[2]	1,050	NE	0	900	1,100
High Boom[2]	1,000	NE	0	900	1,000

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	Hexazinone	Imazapyr	Metsulfuron methyl	Picloram	Triclopyr
Buffer Distance (feet) from Susceptible Plants[1]									
Typical Application Rate									
Aerial	NE	>900	900	300	300	900	900	>900	500
Low Boom	NE	300	900	50	NE	900	900	>900	300
Maximum Application Rate									
Aerial	NE	>900	1,000	300	900	>900	>900	>900	>900
Low Boom	NE	900	1 000	300	NE	>900	>900	>900	>900
Buffer Distance (feet) from Tolerant Terrestrial Plants									
Typical Application Rate									
Aerial	NE	0	0	25	NE	100	50	25	NE
Low Boom	NE	0	0	25	0	25	25	25	NE
Maximum Application Rate									
Aerial	NE	0	25	50	NE	300	100	50	NE
Low Boom	NE	0	25	25	100	50	25	25	NE

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	Fluridone	Imazapic	Overdrive	Sulfometuron methyl
Minimum Buffer Distance (feet) from Fish and Aquatic Invertebrates					
Typical Application Rate					
Aerial	0	NA	0	NA	0
Low boom	0	NA	0	0	0
High boom	0	NA	0	0	0
Maximum Application Rate					

Aerial	0	NA	0	NA	0
Low boom	0	NA	0	0	0
High boom	0	NA	0	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	Fluridone	Imazapic	Overdrive	Sulfometuron methyl
Minimum Buffer Distance (feet) from Fish and Aquatic Invertebrates					
Typical Application Rate					
Aerial	0	NA	0	NA	0
Low boom	0	NA	0	0	0
High boom	0	NA	0	0	0
Maximum Application Rate					
Aerial	0	NA	0	NA	0
Low boom	0	NA	0	0	0
High boom	0	NA	0	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 are designed to maximize beneficial results and minimize negative impacts of management actions, primarily with regards to water quality (USDI 2003a:Appendix D). 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.

1) 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.
2) Control weeds annually in areas frequently disturbed such as gravel pits, recreation sites, road sides, live-stock concentration areas.
3) Consider livestock quarantine, removal, or timing limitations in weed-infested areas.
4) All seed, hay, straw, mulch, or other vegetation material transported and used on public land weed-free zones for site stability, rehabilitation, or project facilitation should be certified by a qualified Federal, state or county officer as free of noxious weeds and noxious weed seed. All baled feed, pelletized feed, and grain transported into weed-free zones and used to feed livestock should also be certified as free of noxious weed seed.
5) 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 and Table 2-4). 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.
- Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.

Revegetation

- Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans.
- Retain bonds until reclamation requirements, including weed treatments, are completed, based on inspection and documentation.
- To prevent conditions favoring weed establishment, re-establish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques.
- Maintain stockpiled, uninfested material in a weed-free condition.
- Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover revegetation. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary.
- Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings).
- Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules.
- Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least 3 growing seasons following completion of the project.
- Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available.
- Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines).
- Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail ROW, and other areas of disturbed soils.

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. These are not the conservation measures applicable to listed fish on the District; those fish are the subject of site-specific consultation being conducted for this EA.

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[3] 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.

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:

- Given the high risk for damage to TEP plants and their habitat from burning, mechanical treatments, and use of domestic animals to contain weeds, none of these treatment methods should be utilized within 330 feet of sensitive plant populations UNLESS the treatments are specifically designed to maintain or improve the existing population.
- Off-highway use of motorized vehicles associated with treatments should be avoided in suitable or occupied habitat.
- Biological control agents (except for domestic animals) that affect target plants in the same genus as TEP species must not be used to control target species occurring within the dispersal distance of the agent.
- Prior to use of biological control agents that affect target plants in the same family as TEP species, the specificity of the agent with respect to factors such as physiology and morphology should be evaluated, and a determination as to risks to the TEP species made.
- 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

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

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 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.

Diflufenzopyr
- If using a low boom at the typical application rate, do not apply within 100 feet of terrestrial TEP plant species.
- If using a high boom, or a low boom at the maximum application rate, do not apply within 900 feet of terrestrial TEP plant species.
- If using a high boom, do not apply within 500 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.

Fluridone
- Since effects on terrestrial TEP plant species are unknown, do not apply within ½ mile of terrestrial TEP 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.

Hexazinone
- Since the risks associated with using a high boom or an aerial application are unknown, only apply this herbicide by ground methods using a low boom within ½ mile of terrestrial TEP plant species and aquatic habitats that support aquatic TEP species.
- Do not apply by ground methods at the typical application rate within 300 feet of terrestrial TEP plant species or aquatic habitats that support aquatic TEP plant species.
- Do not apply by ground methods at the maximum application rate within 900 feet of terrestrial TEP plant species or aquatic habitats that support aquatic TEP plant species.
- In areas where wind erosion is likely, do not apply within ½ mile of 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.

Imazapyr

- Since the risks associated with using a high boom are unknown, use only a low boom for 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 at the typical application rate, by ground or aerial methods, within 900 feet of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur.
- Do not apply at the maximum application rate, by ground or aerial methods, within ½ mile of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur.
- Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Metsulfuron Methyl

- Since the risks associated with using a high boom are unknown, use only a low boom for 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 at the typical application rate, by ground or aerial methods, within 900 feet of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur.
- Do not apply at the maximum application rate, by ground or aerial methods, within ½ mile of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Overdrive®

- If using a low boom at the typical application rate, do not apply within 100 feet of terrestrial TEP plant species.
- If using a low boom at the maximum application rate, do not apply within 900 feet of terrestrial TEP plant species.
- If using a high boom, do not apply within 900 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.

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.

Sulfometuron Methyl

- Do not apply by ground or aerial methods within 1,500 feet of terrestrial TEP species.
- Do not apply by ground methods within 900 feet of aquatic habitats where TEP plant species occur, or by aerial methods within 1,500 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.

Triclopyr Acid

- 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.
- Since the risks associated with using a high boom are unknown, use only a low boom during ground applications at the maximum application rate of this herbicide within ½ mile of aquatic habitats in which TEP plant species occur.

- Do not apply by ground methods at the typical application rate within 300 feet of terrestrial TEP plant species.
- Do not apply by aerial methods at the typical application rate within 500 feet of terrestrial TEP plant species.
- Do not apply by ground or aerial methods at the maximum application rate within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- If applying to aquatic habitats in which aquatic TEP plant species occur, do not exceed the targeted water concentration on the product label.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Triclopyr BEE

- Since the risks associated with using a high boom are unknown, use only a low boom for 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 300 feet of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by aerial methods at the typical application rate within 500 feet of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by ground or aerial methods at the maximum application rate within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

The information provided in Table 4-4 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, non-native 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 Revegetation Treatments

- Outside riparian areas, avoid hydro-mulching within buffer zones established at the local level. This precaution will limit adding sediments and nutrients and increasing water turbidity.
- Within riparian areas, engage in consultation at the local level to ensure that revegetation activities incorporate knowledge of site-specific conditions and project design.

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 (Table 5-5). (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.

Conservation Measures Related to Prescribed Fire

Within riparian areas, in watersheds with TEP species or their habitats:

- Conduct prescribed burning only when long-term maintenance of the riparian area is the primary objective, and where low intensity fires can be maintained.
- Do not construct black lines, except by non-mechanized methods.
- Utilize/create only the following firelines: natural barriers; hand-built lines parallel to the stream channel and outside of buffer zones established at the local level; or hand built lines perpendicular to the stream channel with waterbars and the same distance requirement.
- Do not ignite fires using aerial methods.
- In forested riparian areas, keep fires to low severity levels to ensure that excessive vegetation removal does not occur.
- Do not camp, unless allowed by local consultation.
- Have a fisheries biologist determine whether pumping activity can occur in streams with TEP species.
- During water drafting/pumping, maintain a continuous surface flow of the stream that does not alter original wetted stream width.
- Do not alter dams or channels in order to pump in streams occupied by TEP species.
- Do not allow helicopter dipping from waters occupied by TEP species, except in lakes outside of the spawning period.
- Consult with a local fisheries biologist prior to helicopter dipping in order to avoid entrainment and harassment of TEP species.

Conservation Measures Related to Mechanical Treatments

Note: these measures apply only to treatments occurring in watersheds that support TEP species or in unoccupied habitat critical to species recovery (including but not limited to critical habitat, as designated by USFWS).

Outside riparian areas in watersheds with TEP species or designated or undesignated critical habitat (i.e., unoccupied habitat critical to species recovery):

- Conduct soil-disturbing treatments only on slopes of 20% or less, where feasible.
- Do not conduct log hauling activities on native surface roads prone to erosion, where feasible.

Within riparian areas in these watersheds, more protective measures will be required to avoid negatively affecting TEP species or their habitat:

- Do not use vehicles or heavy equipment, except when crossing at established crossings.
- Do not remove large woody debris or snags during mechanical treatment activities.
- Do not conduct ground disturbing activities (e.g., disking, drilling, chaining, and plowing).

- Ensure that all mowing follows guidance to avoid negative effects to streambanks and riparian vegetation and major effects to streamside shade.
- Do not use equipment in perennial channels or in intermittent channels with water, except at crossings that already exist.
- Leave suitable quantities (to be determined at the local level) of excess vegetation and slash on site.
- Do not apply fertilizers or seed mixtures that contain chemicals by aerial methods.
- Do not apply fertilizer within 25 feet of streams and supersaturated soils; apply fertilizer following labeling instructions.
- Do not apply fertilizer in desert habitats.
- Do not completely remove trees and shrubs.

Conservation Measures Related to Biological Control Treatments using Livestock

For treatments occurring in watersheds that support TEP species or in critical habitat:

- Where terrain permits, locate stock handling facilities, camp facilities, and improvements at least 300 feet from lakes, streams, and springs.
- Educate stock handlers about at-risk fish species and how to minimize negative effects to the species and their associated habitat.
- Employ appropriate dispersion techniques to range management, including judicial placement of saltblocks, troughs, and fencing, to prevent damage to riparian areas but increase weed control.
- Equip each watering trough with a float valve.

Within riparian areas of these watersheds, more protective measures are required.

- Do not conduct weed treatments involving domestic animals, except where it is determined that these treatments will not damage the riparian system, or will provide long-term benefits to riparian and adjacent aquatic habitats.
- Do not locate troughs, storage tanks, or guzzlers near streams with TEP species, unless their placement will enhance weed-control effectiveness without damaging the riparian system.

Local BLM offices should design conservation measures for treatment plans using the above conservation measures as guidance, but altering it as needed based on local conditions and the habitat needs of the particular TEP aquatic species that could be affected by the treatments. Locally-focused conservation measures would be necessary to reduce or avoid potential impacts such that a Not Likely to Adversely Affect determination would be reached during the local-level NEPA process. BLM offices that are responsible for the protection of Northwest salmonids are directed to the guidance document: Criteria for At-Risk Salmonids: National Fire Plan Activities, Version 2.1 (National Fire Plan Technical Team 2002), which contains detailed instructions for developing suitable conservation measures for these TEP species in conjunction with vegetation treatment programs, and from which many of the above-listed conservation measures were taken.

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.
- Minimize mechanical treatments and OHV activities on sites that support host and/or nectar plants.
- Carry out vegetation removal in small areas, creating openings of 5 acres or less in size.
- Avoid burning all of a species' habitat in any 1 year. Limit area burned in butterfly/moth habitat in such a manner that the unburned units are of sufficient size to provide a refuge for the population until the burned unit is suitable for recolonization. Burn only a small portion of the habitat at any one time, and stagger timing so that there is a minimum 2-year recovery period before an adjacent parcel is burned. BLM Vegetation Treatments Programmatic EIS 6-15 June 2007
- Where feasible, mow or wet around patches of larval host plants within the burn unit to reduce impacts to larvae.
- In TEP butterfly/moth habitat, burn while butterflies and/or moths of concern are in the larval stage, when the organisms would receive some thermal protection.
- Wash equipment before it is brought into the treatment area.
- Use a seed mix that contains host and/or nectar plant seeds for road/site reclamation.
- 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.
- Conduct burns during periods when the animals are in aquatic habitats or are hibernating in burrows.
- For species with extremely limited habitat, such as the desert slender salamander, avoid prescribed burning in known habitat.
- Do not use water from aquatic habitats that support TEP amphibians and/or reptiles for fire abatement.
- Install sediment traps upstream of aquatic habitats to minimize the amount of ash and sediment entering aquatic habitats that support TEP species.
- Do not conduct prescribed burns in desert tortoise habitat.
- 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.
- In desert tortoise habitat, conduct herbicide treatments during the period when desert tortoises are less active.
- To the greatest extent possible, avoid desert tortoise burrows during herbicide treatments.
- 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.
- In watersheds where TEP amphibians occur, do not apply triclopyr BEE in upland habitats upslope of aquatic habitats that support (or may potentially support) TEP amphibians under conditions that would likely result in surface runoff.
- 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 spraying imazapyr or metsulfuron methyl in or adjacent to upland habitats occupied by TEP herpetofauna, apply at 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 Measures

- 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.

Prescribed Burning Treatments

- Where feasible, avoid ignition of fires within buffer strips.

Mechanical Treatments

- Minimize the use of mechanical treatment methods (including timber harvest and timber salvage) within buffer strips.
- To avoid damaging potential spawning areas, do not use mechanical equipment in perennial channels, or in intermittent channels with water, except at crossings that already exist. Do not use mechanical equipment in estuaries.
- Minimize log hauling during wet weather, and on non-paved roads.
- Minimize skidding or ground-based yarding within buffer strips.
- Do not remove large woody debris from buffer strips

Herbicide Treatments

- 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).

Biological Treatments

- In watersheds that support salmonids or that flow into watersheds where salmonids occur, to minimize the cumulative effect of grazing in areas that have been burned, do not conduct weed control by domestic animals in burned areas until they have recovered enough to control ash and sediment produced by the treatment.
- Prohibit livestock grazing in estuaries.

Appendix B – The Herbicides, Formulations, and Adjuvants

The Herbicides - The 14 herbicides proposed for use in Oregon are a subset of the hundreds of herbicides registered for use in the U.S. They were chosen by the BLM nationally for maximum effectiveness against wildland weeds and least environmental and non-target species' risks. Table 2-9 in Chapter 2 shows the 14 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 B-1 - *Summary of Herbicides by Registered Site-Types, Application Methods, and General Constraints from the Labels*** supplements the Table 2-9 information by listing potential application methods and a summary of general label constraints.

Herbicides can be categorized as selective or non-selective (see Table 2-9). 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) (Table 2-9).

Table B-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. This list identifies herbicides that are known to be consistent with the formulations analyzed in the Risk Assessments (see Appendix C) and otherwise suitable for wildland use.

Table B-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. This list identifies adjuvants that are known to be consistent with the formulations analyzed in the Risk Assessments (see Appendix C) and are known not to contain R-11, petroleum, and other products prohibited by mitigation measures (see Appendix A), or that are otherwise considered unsuitable for wildland use. Table B-3 also identifies those adjuvants identified by the US Fish and Wildlife Service in their 2013 *Biological Opinion for Fish Habitat Restoration Activities Affecting ESA-listed Animal and Plant Species and their Designated Critical Habitat found in Oregon, Washington and parts of California, Idaho and Nevada* (USFWS 2013) as appropriate for use near streams with listed fish. These adjuvants are designated under the column "ARBO II", for the second programmatic Aquatic Restoration Biological Opinion.

Table B-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 washwaters.
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 aquafers. • 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.
Dicamba + Diflufenzopyr	Rangeland Energy Mineral sites Rights-of-way Industrial Pipeline	Backpack, horseback, ATV, and truck (spot, boom/broadcast)	• No aerial application of this mix (BLM Nat'l EIS). • Do not load, mix, or apply within 50 ft of wells. • Do not apply directly to water, where surface water is present, or to intertidal areas. Do not contaminate water when disposing of equipment washwaters. • Do not apply to impervious substrates or under conditions which favor runoff. Do not apply to soils which classify as sand. • Be cognizant of leaching where soils are permeable or where water table is

Herbicides	Registered for: Programs/Treatment Areas	Application Method	General Constraints from Label *(follow all label requirements)*
			shallow.
Fluridone	Aquatic	Helicopter , boat, backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Consult local state fish and game agency and water control authorities before applying this product to public water. Permits may be required. • Do not apply in tidewater/brackish water.
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.
Hexazinone	Rangeland Public domain forestland Energy and mineral sites Rights-of-way Recreation	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. • Use care where soils are permeable to avoid groundwater contamination. • Will kill grasses.
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.
Imazapyr	Riparian/wetland Rights-of-way	Helicopter, backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Aquatic applications (with approved products) can only be made within the restrictions outlined on the label. • Otherwise, 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.
Metsulfuron methyl	Rangeland Public domain forestland Energy and mineral sites	Plane, helicopter backpack, horseback, ATV, and truck (spot,	• 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.

Herbicides	Registered for: Programs/Treatment Areas	Application Method	General Constraints from Label *(follow all label requirements)*
	Rights-of-way Recreation ESR	boom/broadcast)	• This herbicide is injurious to plants at extremely low concentrations. Nontarget plants may be adversely effected from drift and run-off.
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.
Sulfometuron methyl	Public domain forestland Energy and mineral sites Rights-of-way Recreation	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. • Applications to powdery, dry soil when there is low likelihood of rain soon may result in off-site damage by wind-borne soil particles. • Do not treat frozen soil. • Do not apply in or on irrigation ditches or canals, including their outer banks.
Triclopyr	Riparian/wetland Rangeland Public domain forestland Energy and mineral sites Rights-of-way Recreation	Plane, helicopter backpack, horseback, ATV, and truck (spot, boom/broadcast)	• Consult local state fish and game agency and water control authorities before applying this product to public water to determine if a permit is needed. • Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of plants in certain situations, which can cause fish suffocation.. • Certain approved products can be used in and around standing water sites. Minimize overspray to open water (streams, lakes, etc) when treating vegetation growing at water edge. Do not contaminate water when disposing of equipment wash-water.

Table B-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.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
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.
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.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
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.
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.
Clopyralid + 2, 4-D	Commando	Albaugh, Inc.	42750-92	0.38 + 2.0	Lbs. a.e. / gal., respectively
Clopyralid + 2, 4-D	Curtail	Dow AgroSciences	62719-48	0.38 + 2.0	Lbs. a.e. / gal., respectively

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
Clopyralid + 2, 4-D	Cutback	Nufarm Americas Inc.	71368-72	0.38 + 2.0	Lbs. a.e. / gal., respectively
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
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
Dicamba + Diflufenzopyr	Distinct	BASF Corporation	7969-150	50 + 20	% a.e., respectively
Dicamba + Diflufenzopyr	Overdrive	BASF Corporation	7969-150	50 + 20	% a.e., respectively
Fluridone	Avast!	SePRO	67690-30	4.0	Lbs. a.i. / gal.
Fluridone	Sonar AS	SePRO	67690-4	4.0	Lbs. a.i. / gal.
Fluridone	Sonar Precision Release	SePRO	67690-12	5	% a.i.
Fluridone	Sonar Q	SePRO	67690-3	5	% a.i.
Fluridone	Sonar SRP	SePRO	67690-3	5	% a.i.
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	GlyStar 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.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
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.
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.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
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.
Glyphosate + 2, 4-D	Landmaster BW	Albaugh, Inc./Agri Star	42570-62	0.9 + 1.5	Lbs. a.e. / gal., respectively
Glyphosate + 2, 4-D	Campaign	Monsanto	524-351	0.9 + 1.5	Lbs. a.e. / gal., respectively
Glyphosate + 2, 4-D	Landmaster BW	Monsanto	524-351	0.9 + 1.5	Lbs. a.e. / gal., respectively
Hexazinone	Velpar ULW	DuPont Crop Protection	352-450	75	% a.i.
Hexazinone	Velpar L	DuPont Crop Protection	352-392	2.0	Lbs. a.i. / gal.
Hexazinone	Velpar DF	DuPont Crop Protection	352-581	75	% a.i.
Hexazinone	Velosa	Helena Chemical Company	5905-579	2.4	Lbs. a.i. / gal.
Hexazinone	Pronone MG	Pro-Serve	33560-21	10	% a.i.
Hexazinone	Pronone 10G	Pro-Serve	33560-21	10	% a.i.
Hexazinone	Pronone 25G	Pro-Serve	33560-45	25	% a.i.
Hexazinone	Pronone Power Pellet	Pro-Serve	33560-41	75	% a.i.
Hexazinone + Sulfometuron methyl	Oustar	DuPont Crop Protection	352-603	63.2 + 11.8	% a.i., respectively
Hexazinone + Sulfometuron methyl	Westar	DuPont Crop Protection	352-626	68.6 + 6.5	% a.i., respectively
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.
Imazapic + Glyphosate	Journey	BASF Corporation	241-417	0.75 + 1.5	Lbs. a.e. / gal., respectively
Imazapyr	Imazapyr 2SL	Alligare, LLC	81927-23	2.0	Lbs. a.e. / gal.
Imazapyr	Imazapyr 4SL	Alligare, LLC	81927-24	4.0	Lbs. a.e. / gal.
Imazapyr	Ecomazapyr 2SL	Alligare, LLC	81927-22	2.0	Lbs. a.e. / gal.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
Imazapyr	Rotary 2 SL	Alligare, LLC	81927-6	2.0	Lbs. a.e. / gal.
Imazapyr	Arsenal Railroad Herbicide	BASF Corporation	241-273	2.0	Lbs. a.e. / gal.
Imazapyr	Chopper	BASF Corporation	241-296	2.0	Lbs. a.e. / gal.
Imazapyr	Arsenal Applicators Conc.	BASF Corporation	241-299	4.0	Lbs. a.e. / gal.
Imazapyr	Arsenal	BASF Corporation	241-346	2.0	Lbs. a.e. / gal.
Imazapyr	Arsenal PowerLine	BASF Corporation	241-431	2.0	Lbs. a.e. / gal.
Imazapyr	Stalker	BASF Corporation	241-398	2.0	Lbs. a.e. / gal.
Imazapyr	Habitat	BASF Corporation	241-426	2.0	Lbs. a.e. / gal.
Imazapyr	Polaris	Nufarm Americas Inc.	228-534	2.0	Lbs. a.e. / gal.
Imazapyr	Polaris AC	Nufarm Americas Inc.	241-299-228	4.0	Lbs. a.e. / gal.
Imazapyr	Polaris AC	Nufarm Americas Inc.	228-480	4.0	Lbs. a.e. / gal.
Imazapyr	Polaris AC Complete	Nufarm Americas Inc.	228-570	4.0	Lbs. a.e. / gal.
Imazapyr	Polaris AQ	Nufarm Americas Inc.	241-426-228	2.0	Lbs. a.e. / gal.
Imazapyr	Polaris RR	Nufarm Americas Inc.	241-273-228	2.0	Lbs. a.e. / gal.
Imazapyr	Polaris SP	Nufarm Americas Inc.	228-536	2.0	Lbs. a.e. / gal.
Imazapyr	Polaris SP	Nufarm Americas Inc.	241-296-228	2.0	Lbs. a.e. / gal.
Imazapyr	Polaris Herbicide	Nufarm Americas Inc.	241-346-228	2.0	Lbs. a.e. / gal.
Imazapyr	Habitat Herbicide	SePRO	241-426-67690	2.0	Lbs. a.e. / gal.
Imazapyr	SSI Maxim Arsenal 0.5G	SSI Maxim Co., Inc.	34913-23	0.5	% a.e.
Imazapyr	SSI Maxim Arsenal 5.0 G	SSI Maxim Co., Inc.	34913-24	5	% a.e.
Imazapyr	Ecomazapyr 2 SL	Vegetation Man., LLC	74477-6	2.0	Lbs. a.e. / gal.
Imazapyr	Imazapyr 2 SL	Vegetation Man., LLC	74477-4	2.0	Lbs. a.e. / gal.
Imazapyr	Imazapyr 4 SL	Vegetation Man., LLC	74477-5	4.0	Lbs. a.e. / gal.
Imazapyr + Metsulfuron methyl	Lineage Clearstand	DuPont Crop Protection	352-766	63.2 + 9.5	% a.i., respectively
Imazapyr + Sulfometuron methyl + Metsulfuron methyl	Lineage HWC	DuPont Crop Protection	352-765	37.5 + 28.1 + 7.5	% a.i., respectively
Imazapyr + Sulfometuron methyl + Metsulfuron methyl	Lineage Prep	DuPont Crop Protection	352-767	54.5 + 15.3 + 4.1	% a.i., respectively
Metsulfuron methyl	MSM 60	Alligare, LLC	81927-7	60	% a.i.
Metsulfuron methyl	AmTide MSM 60DF Herbicide	AmTide, LLC	83851-3	60	% a.i.
Metsulfuron methyl	Escort DF	DuPont Crop Protection	352-439	60	% a.i.
Metsulfuron methyl	Escort XP	DuPont Crop Protection	352-439	60	% a.i.
Metsulfuron methyl	MSM E-Pro 60 EG Herbicide	Etigra, LLC	81959-14	60	% a.i.
Metsulfuron methyl	MSM E-AG 60 EG Herbicide	Etigra, LLC	81959-14	60	% a.i.

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
Metsulfuron methyl	Patriot	Nufarm Americas Inc.	228-391	60	% a.i.
Metsulfuron methyl	PureStand	Nufarm Americas Inc.	71368-38	60	% a.i.
Metsulfuron methyl	Metsulfuron Methyl DF	Vegetation Man., LLC	74477-2	60	% a.i.
Metsulfuron methyl + Chlorsulfuron	Cimarron X-tra	DuPont Crop Protection	352-669	30 + 37.5	% a.i., respectively
Metsulfuron methyl + Chlorsulfuron	Cimarron Plus	DuPont Crop Protection	352-670	48 + 15	% a.i., respectively
Metsulfuron methyl + Dicamba + 2, 4-D	Cimarron MAX	DuPont Crop Protection	352-615	60 and 1.0 + 2.87	% a.i. and lbs. a.e., respectively
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.
Picloram + 2, 4-D	GunSlinger	Albaugh, Inc.	42750-80	0.54 + 2.0	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Picloram + D	Alligare, LLC	81927-16	0.54 + 2.0	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Tordon 101 Mixture	Dow AgroSciences	62719-5	0.54 + 2.0	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Tordon 101 R Forestry	Dow AgroSciences	62719-31	0.28 + 1.057	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Tordon RTU	Dow AgroSciences	62719-31	0.28 + 1.057	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Grazon P+D	Dow AgroSciences	62719-182	0.54 + 2.0	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	HiredHand P+D	Dow AgroSciences	62719-182	0.54 + 2.0	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Pathway	Dow AgroSciences	62719-31	0.28 + 1.057	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Trooper 101	Nufarm Americas Inc.	228-561	0.54 + 2.0	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D	Trooper P + D	Nufarm Americas Inc.	228-530	0.54 + 2.0	Lbs. a.e. / gal., respectively
Picloram + 2, 4-D + Dicamba	Trooper Extra	Nufarm Americas Inc.	228-586	0.5 + 2.0 + 0.5	Lbs. a.e. / gal., respectively
Sulfometuron methyl	SFM 75	Alligare, LLC	81927-26	75	% a.i.
Sulfometuron methyl	Oust DF	DuPont Crop Protection	352-401	75	% a.i.
Sulfometuron methyl	Oust XP	DuPont Crop Protection	352-601	75	% a.i.
Sulfometuron methyl	SFM E-Pro 75EG	Etigra, LLC	79676-16	75	% a.i.
Sulfometuron methyl	Spyder	Nufarm Americas Inc.	228-408	75	% a.i.
Sulfometuron methyl	SFM 75	Vegetation Man., L.L.C.	72167-11-74477	75	% a.i.
Sulfometuron methyl +	Landmark XP	DuPont Crop Protection	352-645	50 + 25	% a.i., respectively

Common Name	Trade Name	Manufacturer	EPA Reg. Number	Concentration	Units of Concentration
Chlorsulfuron					
Sulfometuron methyl + Metsulfuron methyl	Oust Extra	DuPont Crop Protection	352-622	56.25 + 15	% a.i., respectively
Sulfometuron methyl + Metsulfuron methyl	SFM Extra	DuPont Crop Protection	81927-5	56.25 + 15	% a.i., respectively
Triclopyr	Triclopry 4	Alligare, LLC	81927-11	4.0	Lbs. a.e. / gal.
Triclopyr	Triclopyr 3	Alligare, LLC	81927-13	3.0	Lbs. a.e. / gal.
Triclopyr	Triclopyr RTU	Alligare, LLC	81927-33	0.8	Lbs. a.e. / gal.
Triclopyr	Element 3A	Dow AgroSciences	62719-37	3.0	Lbs. a.e. / gal.
Triclopyr	Element 4	Dow AgroSciences	62719-40	4.0	Lbs. a.e. / gal.
Triclopyr	Forestry Garlon XRT	Dow AgroSciences	62719-553	6.3	Lbs. a.e. / gal.
Triclopyr	Garlon 3A	Dow AgroSciences	62719-37	3.0	Lbs. a.e. / gal.
Triclopyr	Garlon 4	Dow AgroSciences	62719-40	4.0	Lbs. a.e. / gal.
Triclopyr	Garlon 4 Ultra	Dow AgroSciences	62719-527	4.0	Lbs. a.e. / gal.
Triclopyr	Remedy	Dow AgroSciences	62719-70	4.0	Lbs. a.e. / gal.
Triclopyr	Remedy Ultra	Dow AgroSciences	62719-552	4.0	Lbs. a.e. / gal.
Triclopyr	Pathfinder II	Dow AgroSciences	62719-176	0.75	Lbs. a.e. / gal.
Triclopyr	Trycera	Helena Chemical Company	5906-580	2.87	Lbs. a.e. / gal.
Triclopyr	Relegate	Nufarm Americas Inc.	228-521	4.0	Lbs. a.e. / gal.
Triclopyr	Relegate RTU	Nufarm Americas Inc.	228-522	0.75	Lbs. a.e. / gal.
Triclopyr	Tahoe 3A	Nufarm Americas Inc.	228-384	3.0	Lbs. a.e. / gal.
Triclopyr	Tahoe 3A	Nufarm Americas Inc.	228-518	3.0	Lbs. a.e. / gal.
Triclopyr	Tahoe 3A	Nufarm Americas Inc.	228-520	3.0	Lbs. a.e. / gal.
Triclopyr	Tahoe 4E	Nufarm Americas Inc.	228-385	4.0	Lbs. a.e. / gal.
Triclopyr	Tahoe 4E Herbicide	Nufarm Americas Inc.	228-517	4.0	Lbs. a.e. / gal.
Triclopyr	Renovate 3	SePRO Corporation	62719-37-67690	3.0	Lbs. a.e. / gal.
Triclopyr	Renovate OTF	SePRO Corporation	67690-42	10	% a.e.
Triclopyr	Ecotriclopyr 3 SL	Vegetation Man., LLC	72167-49-74477	3.0	Lbs. a.e. / gal.
Triclopyr	Triclopyr 3 SL	Vegetation Man., LLC	72167-53-74477	3.0	Lbs. a.e. / gal.
Triclopyr + 2, 4-D	Everett	Alligare, LLC	81927-29	1.0 + 2.0	Lbs. a.e. / gal., respectively
Triclopyr + 2, 4-D	Crossbow	Dow AgroSciences	62719-260	1.0 + 2.0	Lbs. a.e. / gal., respectively
Triclopyr + 2, 4-D	Aquasweep	Nufarm Americas Inc.	228-316	1.07 + 2.78	Lbs. a.e. / gal., respectively
Triclopyr + 2, 4-D	Candor	Nufarm Americas Inc.	228-565	1.0 + 2.0	Lbs. a.e. / gal., respectively
Triclopyr + Clopyralid	Prescott Herbicide	Alligare, LLC	81927-30	2.25 + 0.75	Lbs. a.e. / gal., respectively
Triclopyr + Clopyralid	Redeem R&P	Dow AgroSciences	62719-337	2.25 + 0.75	Lbs. a.e. / gal., respectively
Triclopyr + Clopyralid	Brazen	Nufarm Americas Inc.	228-564	2.25 + 0.75	Lbs. a.e. / gal., respectively

1. Updated May 14, 2014. 2. a.e.= acid equivalent 3. a.i. = active ingredient

Table B-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.	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
Spreader/Sticker	Bond	Loveland Products Inc.	√
Spreader/Sticker	Bond Max	Loveland Products Inc.	
Spreader/Sticker	Tactic	Loveland Products Inc.	√
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.	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
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	
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 Specialities	
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.	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
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	
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 Specialities, 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.	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
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)	
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 Specialities, 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 Specialities, Inc.	
Diluent/Deposition Agent	Thinvert Concentrate	Waldrum Specialities, 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.	

Adjuvant Type	Trade Name	Manufacturer	ARBO II[2]
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.	
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 Specialities, 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 C - Herbicide Risk Assessment Summaries

See the *Human Health and Ecological Risk Assessments* section early in Chapter 3 for an introduction to the Risk Assessments, and to the risk tables presented in this Appendix and used in the individual resource effects sections in Chapter 3.

EPA terms
LD_{50} Lethal Dose to 50% of the population
LOC Level of Concern
NOAEL No Observed Adverse Effect Level
LOAEL Lowest Observed Adverse Effect Level

BLM terms
RQ Risk Quotient
ECC Estimated Exposure Concentration
TRV Toxicity Reference Value
ARI Aggregated Risk Index

Forest Service Terms
HQ Hazard Quotient
RfD Reference Dose
TI Toxicity Index

Risk[4]

EPA Labels

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) establishes procedures for the registration, classification, and regulation of all herbicides. Before any herbicides may be sold legally, the EPA must register it. The EPA may classify an herbicide for general use if it determines that the herbicide is not likely to cause unreasonable adverse effects to applicators or the environment, or it may be classified for restricted use if the herbicide must be applied by a certified applicator and in accordance with other restrictions. The herbicide label is a legal document specifying allowable uses; all applicators that apply herbicides on public lands must comply with the application rates, uses, handling, and all other instructions on the herbicide label, and where more restrictive, the rates, uses, and handling instructions developed by the BLM.

Acute toxicity: The quality or potential of a substance to cause injury or illness shortly after exposure through a single or short-term exposure.

Chronic toxicity: The ability of a substance or mixture of substances to cause harmful effects over an extended period, usually upon repeated or continuous exposure sometimes lasting for the entire life of the exposed organism.

In addition to sub-chronic and chronic toxicity, EPA herbicide registration looks at the acute toxicity of an herbicide. Acute toxicity is the most common basis for comparing the relative toxicities of herbicides. Acute toxicity can be measured by LD_{50}[5]. LD_{50} (LD = lethal dose) represents the amount of herbicide that results in the death of 50 percent of a test population. Therefore, the lower the LD_{50}, the more toxic the herbicide. Table C-1 shows the three categories that the EPA uses for classifying herbicides (USDI 1992a).

Table C-1. Herbicide Label Categories

Categories	Signal Word Required on Label	Oral LD_{50} (mg/ kg)	Dermal LD_{50} (mg/kg)	Inhalation LD_{50} (mg/kg)	Probable Oral Lethal Dose for 150 lb. Human
I – Highly Toxic	DANGER, POISON, skull & crossbones	Up to and including 50	Up to and including 200	Up to and including 0.2	A few drops to a teaspoonful
II – Moderately Toxic	WARNING	From 50 to 500	From 200 to 2,000	From 0.2 to 2	Over one teaspoonful to one ounce
III – Slightly Toxic	CAUTION	From 500 to 5,000	From 2,000 to 20,000	From 2 to 20	Over one ounce to one pint or one pound.

[4] Adapted from the Oregon FEIS pp. 85-91 (USDI 2010a).
[5] or LC_{50} (lethal concentration) in the case of aquatic organisms.

In addition, the EPA has established Levels of Concern (LOC) for herbicides, which is the dose of the herbicide above which effects would be expected. The LOCs are used by EPA for registration, and to indicate potential risk to non-target organisms and the need to consider regulatory action (EPA 2007b). In the absence of information indicating otherwise, the LOC is generally 1/10th of the Lowest Observed Adverse Effect Level (LOAEL); that is, the lowest dose level where there was a statistically significant increase in frequency or severity of adverse effects[6] to the test organism. In some cases, no adverse reaction happens at any dose (or at any reasonable dose), and the LOC is the No Observed Adverse Effect Level (NOAEL). LOCs include uncertainty factors based on the amount and nature of the toxicity testing on which they are based.

Risk Assessments

One of the *Purposes* identified in Chapter 1 of this EA is: *d. Prevent control treatments from having unacceptable adverse effects to applicators and the public, to desirable flora and fauna, and to soil, air, and water.* To help address this *Purpose*, this EA relies on BLM and/or Forest Service-prepared Human Health and Ecological Risk Assessments for the 14 herbicides analyzed in this EA. These complete Risk Assessments are included in the Oregon FEIS as *Appendix 8: Risk Assessments* (uncirculated). The Risk Assessments are used to quantitatively evaluate the probability (i.e., risk) that herbicide use in wildland settings might pose harm to humans or other species in the environment. As such, they address many of the risks that would be faced by humans, plants, and animals, including Federally Listed and other Special Status species, from the use of the herbicides. The level of detail in the Risk Assessments far exceeds that normally found in EPA's registration examination.

Risk is defined as the likelihood that an effect (injury, disease, death, or environmental damage) may result from a specific set of circumstances. It can be expressed in quantitative or qualitative terms. While all human activities carry some degree of risk, some risks are known with a relatively high degree of accuracy because data have been collected on the historical occurrence of related problems (e.g., lung cancer caused by smoking, auto accidents caused by alcohol impairment, and fatalities resulting from airplane travel). For several reasons, risks associated with exposure to herbicides (at least in wildland settings) cannot be so readily determined. The Risk Assessments help evaluate the risks resulting from these situations.

Risk Assessments are necessarily done on a surrogate species in laboratory conditions, identified to represent a species group, as toxicological data does not exist for most native non-target species. Survival, growth, reproduction, and other important sub-lethal processes of both terrestrial and aquatic non-target species were considered. Assessments considered acute and chronic toxicity data. Exposures of receptors[7] to direct spray, surface runoff, wind erosion, and accidental spills were analyzed.

Most of the Human Health and Ecological Risk Assessments were developed by the BLM for the 2007 PEIS, or by the Forest Service (FS) for the 2005 *Pacific Northwest Region Invasive Plant Program EIS* (see Table C-2). The Risk Assessments, related separate analyses, and the PEIS includes analysis of degradates and other ingredients for which information is available and not constrained by confidential business information (CBI) restrictions. Preparing a risk assessment for every conceivable combination of herbicide, tank mix, adjuvants (including surfactants), and other possible mixtures is not feasible, as the BLM cannot prepare hundreds of risk assessments, and the cost would be exorbitant. To the degree a toxic substance is known to pose a significant human or ecological risk, the BLM has undertaken analysis to assess its impacts through Risk Assessments. More detailed information about uncertainty in the Risk Assessment process is included in Appendix 13 of the Oregon FEIS.

[6] Lethal or sub-lethal.
[7] An ecological entity such as a human, fish, plant, or slug.

Table C-2. *Human Health and Ecological Risk Assessment Sources*

	Human Health	Ecological
2,4-D	Forest Service	
Chlorsulfuron	FS	BLM
Clopyralid	Forest Service	
Dicamba	Forest Service	
Dicamba + diflufenzopyr	NA	BLM
Diflufenzopyr	BLM	NA
Fluridone	BLM	
Glyphosate	Forest Service	
Hexazinone	Forest Service	
Imazapic	BLM	
Imazapyr	Forest Service	
Metsulfuron methyl	Forest Service	
Picloram	Forest Service	
Sulfometuron methyl	BLM	
Triclopyr	Forest Service	

When evaluating risks from the use of herbicides proposed in a NEPA planning document, reliance on EPA's herbicide registration process as the sole demonstration of safety is insufficient. The U.S. Forest Service and BLM were involved in court cases in the early 1980s that specifically addressed this question (principally *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1248 (9th Cir. 1984) and *Southern Oregon Citizens v. Clark*, 720 F. 2d 1475, 1480 (9th Cir. 1983)). These court decisions and others affirmed that although the BLM can use EPA toxicology data, it is still required to do an independent assessment of the potential risks of using herbicides rather than relying on FIFRA registration alone. The Courts have also found that FIFRA does not require the same examination of impacts that the BLM is required to undertake under NEPA. Further, Risk Assessments consider data collected from both published scientific literature and data submitted to EPA to support FIFRA product registration, whereas EPA utilizes the latter data only. The EPA also considers many wildland herbicide uses to be minor. Thus, the project-specific application rates, spectrum of target and non-target organisms, and specialized exposure scenarios evaluated by the BLM are frequently not evaluated by EPA in its generalized registration assessments.

The Risk Assessments and their distillation in the Oregon FEIS are the source for much of the individual herbicide information presented in each of the resource sections in this EA, including the high-moderate-low risk categories shown in the tables in this Appendix.

Drift

Assuming non-target animals and plants are not directly sprayed, drift is the process most likely to result in herbicides getting onto non-target plants and animals, as well as getting onto non-target areas such as stream channels. Drift, defined as that part of a sprayed herbicide that is moved from the target area by wind while it is still airborne, is primarily dependent upon the elevation of the spray nozzle, droplet size and air movement. The smaller the droplet, the longer it stays suspended and the farther it can travel. Drift is one exposure scenario examined in the Risk Assessments and summarized on the risk tables at the end of this Chapter.

Spray drift can be reduced by increasing droplet size since wind will move large droplets less than small droplets (Table 4-18). Droplet size can be increased by: 1) reducing spray pressure; 2) increasing nozzle orifice size; 3) using special drift reduction nozzles; 4) using additives that increase spray viscosity; and, 5) using rearward orientation in aircraft. Commercial drift reduction agents are available that are designed to reduce drift beyond the capabilities of the determinants described above. These products create larger and more cohesive droplets that are less apt to break into small particles as they fall through the air. They reduce the percentage of smaller, lighter particles, which are most apt to drift. Standard Operating Procedures for air quality provide techniques for controlling drift, including specifying selection of equipment that produces 200-800-micron diameter droplets.

Drift includes droplets and vapor. In general, however, herbicides have very low vapor pressures and BLM spray mixtures do not produce much vapor. One study showed that with more volatile insecticides, little or no vapor drift was detected 9-27 meters downwind for insecticides with vapor pressures less than $1x10^{-4}$ mm Hg (Woodward et al. 1997). All of the herbicides covered by the EIS have very low vapor pressures (maximum is $4x10^{-6}$ mm Hg and they range to as low as $5.5x10^{-16}$ mm Hg; Vencill et al. 2002).

High, Moderate, and Low Risk in BLM and Forest Service Risk Assessments

The Risk Assessments attempt to measure both acute toxicity and chronic toxicity. Chronic toxicity is difficult to measure, especially in humans, but shows the results of sub-lethal doses that could result in cumulative deposits that could cause long-term problems in a vital body function. There is no standard measure for chronic toxicity.

BLM Ecological Risk Assessments

The BLM Ecological Risk Assessments established a Risk Quotient (RQ) for every herbicide and defined risk categories as follows:

0	No Risk	RQ < most conservative LOC for the species
L	Low Risk	RQ = 1 to 10 times the most conservative LOC for the species
M	Moderate Risk	RQ = 10 to 100 times the most conservative LOC for the species (generally equal to LOAEL to 10-times LOAEL)
H	High Risk	RQ > 100 times the most conservative LOC for the species

The RQ is calculated using the Estimated Exposure Concentration (EEC) and the Toxicity Reference Value (TRV). The EEC is the dose that an organism would be exposed to under the test scenario; e.g., *consumption* would indicate the amount of herbicide eaten on a sprayed material (a cow eating only sprayed grass for a day, for example), and *direct spray* indicates that the organism was sprayed directly with a wand or was in a flight path (a non-target plant species, for example). The TRV is the toxicity of the herbicide – usually the LOAEL or NOAEL. The RQ is the EEC divided by the TRV. An uncertainty factor can be brought in if it is thought that a species (or a particular individual within the species) is particularly susceptible to herbicide use, or that the single dose does not represent long-term exposure.

For example, the TRV (the dose that can be consumed with a potentially adverse effect) for a mule deer consuming vegetation contaminated with bromacil is 170 milligrams per kilogram of body weight per day (a mule deer weighs an estimated 70 kg). Assuming a daily consumption rate of 6.2 kg of forage, all contaminated with bromacil sprayed at the typical application rate (4 lbs/acre), the EEC (the amount of herbicide that the mule deer will be exposed to by eating the contaminated vegetation) is 33.7 milligrams per kilograms of body weight per day. Therefore, the RQ is 33.7 mg/kg divided by 170 mg/kg, or 0.198, which is a risk category of 0 (or no risk).

Tank Mixes - The BLM evaluated risks from mixing two herbicides together in a tank mix. The BLM assumed that products in a tank mix act in an additive manner. Therefore, to simulate a tank mix of two herbicides RQs for those two herbicides were combined (see Appendix 8 in the Oregon FEIS; fluridone is not generally tank mixed by the BLM and was not included in the analysis). The application rates within the tank mix are not necessarily the same as those of each individual active ingredient applied alone. The percent of RQs exceeding LOCs for each of the ten BLM herbicide active ingredients was compared to the percent of RQs exceeding LOCs for tank mixes, to determine whether additional risks were predicted for tank mixes.

BLM Human Health Risk Assessments

The BLM Human Health Risk Assessments used the Aggregated Risk Index (ARI) and defined risk categories as follows:

0	No Risk	Majority of ARIs > 1
L	Low Risk	Majority of ARIs < 1 but > 0.1
M	Moderate Risk	Majority of ARIs < 0.1 but > 0.01
H	High Risk	Majority of ARIs < 0.01

The ARI is a formula for combining LOCs for all exposure avenues (oral, dermal, inhalation), each with different uncertainty factors, and comparing them with the exposure levels that would occur in the scenarios in the Risk Assessments. ARIs less than 1 indicate a concern from at least one of the exposure avenues (EPA 2001b:51-55).

Forest Service Risk Assessments

The Forest Service Risk Assessments are very similar to the BLM's. The Forest Service Risk Assessments established a Hazard Quotient (HQ) for every herbicide and established risk categories as follows:

0	No Risk	HQ < LOC for the species
L	Low Risk	HQ = 1 to 10 times the LOC[8] for the species
M	Moderate Risk	HQ = 10 to 100 times the LOC for the species
H	High Risk	HQ > 100 times the LOC for the species

The HQ is calculated using the Reference Dose (RfD) and the Toxicity Index (TI). The RfD is the dose that an organism would be exposed to under the test scenario; the TI is the toxicity of the herbicide and the HQ is the RfD divided by the TI. An uncertainty factor can be brought in if it is thought that a species (or a particular individual within the species) is particularly susceptible to herbicide use, or that the single dose does not represent long-term exposure.

Figure D-1 shows the basis for Risk Assessments, which consists of the following parts:

- *Hazard Identification*: what are the dangers inherent with the herbicide? (e.g., endocrine disruption, cancer causing, etc.)
- *Exposure Assessment*: who could come into contact and how much? (specific exposure scenarios)
- *Dose Response Assessment*: how much is too much? At what dose are observable effects observed?
- *Risk Characterization*: indicates whether or not there is a plausible basis for concern (HQ or RQ).

Figure D-1. Basis for Risk Assessments

Stated another way, the lower range for the L, or low, risk category is theoretically the level at which an effect began to be discernable in testing or modeling (theoretically, because uncertainty factors have the effect of reducing the dose identified as having the adverse effect). The minimum identified effect may have been skin or eye irritation, leaf damage, and so forth. Uncertainty factors are added to address hypersensitive individuals, or accommodate uncertainties in the measurements, such as inferring effects to one species based on actual tests on other species. Uncertainty factors are typically multiples of 10, so the assumed Lowest Observable Effects (LOAEL) dose could have been inflated 10, 100, or even 1,000 times for uncertainties. Thus, exposure of the average individual to the dose identified as having an effect, probably would not. Nevertheless, the L or low rating indicates risks start at that point. Moderate risk categories indicate risk starts at doses one-tenth those of the low ratings; high is one-

[8] As noted in the previous discussion, LOCs are generally set at 1/10th of the LOAEL. Thus, an HQ of 1 to 10 times LOC is equivalent to an HQ of 0.1 to 1 in the 2005 Forest Service Invasive Plant EIS (USDA 2005a:4-73). The Forest Service EIS goes on to explain "The threshold is intended to help reviewers distinguish moderate risks (HQ=2 to 10 [HQ = 20-100 in this EIS]), which could in most cases be mitigated through exposure-reducing project design criteria from significant health risks (HQ>10 [HQ>100 in this EIS]) that could be difficult to mitigate if Worst-Case situations occur at the project level. For specific situations where a HQ>10 [HQ>100 in this EIS] is identified, the specific physiologic effect and the relationship between the NOAEL and the LOAEL may be evaluated to more precisely determine whether a toxic effect is actually likely to occur (Durkin, personal communication)." (USDA 2005a:4-73)

hundredth of the testing scenario dose. Testing scenarios are severe – e.g., soaking the test animal – so Standard Operating Procedures and PEIS Mitigation Measures such as buffers, wind speed limits, and so forth, as well as required safety equipment, limit exposure to substantially less than tested doses. For herbicides with moderate and high risk categories for a particular receptor, special cautions are implemented. For example, buffers for Special Status plant species are as large as 1,500 feet for some herbicides (Table A2-1). The low, moderate, or high human health risk categories shown on Tables D-3 through D-8 are more conservative than the EPA ratings used to apply the Caution, Warning, or Danger/Poison signal words to herbicide labels.

The Risk Assessments are summarized on tables showing herbicide risk categories at BLM maximum and typical application rates to vegetation, wildlife, and humans, in a variety of application scenarios. Tables D-3 and D-6 show herbicide risks to vegetation, from BLM and Forest Service Risk Assessments respectively. Tables D-4 and D-7 show herbicide risks to wildlife, fish, and aquatic invertebrates and Tables D-5 and D-8 show the risks to human health. Further information about the Human Health Risk Assessments can be found in the *Human Health and Safety* section of Chapter 4 of the Oregon FEIS.

Uncertainty in the Risk Assessment Process

The Risk Assessments conducted by the BLM and Forest Service incorporate various conservative assumptions to compensate for uncertainties in the risk assessment process. Within any of the steps of the human health risk evaluation process, assumptions were made due to a lack of absolute scientific knowledge. Some of the assumptions are supported by considerable scientific evidence, while others have less support. Every assumption introduces some degree of uncertainty into the risk evaluation process. Regulatory risk evaluation methodology requires that conservative assumptions be made throughout the risk assessment process to ensure that public health is protected. This conservatism, both in estimating exposures and in setting toxicity levels likely led to an exaggeration of the real risks of the vegetation management program to err on the side of protecting human health and other species.

Cumulative effects of long-term use of herbicides may have different outcomes than risk assessments can anticipate. Although identification of adverse effects from chronic exposures is one of the parameters examined in the risk assessment process, it is possible there are long-term sub-lethal effects on reproductive or migratory behavior from low concentrations of herbicides or additives that are not documented in the Risk Assessments.

See additional information about uncertainty near the end of Appendix 13 of the Oregon FEIS.

Table C-3. BLM-Evaluated Herbicide Risk Categories for Vegetation

Application Scenario	Chlorsulfuron		Fluridone		Imazapic		Overdrive		Sulfometuron	
	Typ[1]	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Direct Spray										
Terrestrial plants	H[2] [1:1]	H [1:1]	NE	NE	L [1:1]	M [1:1]	M [1:1]	H [1:1]	0 [1:1]	L [1:1]
Special Status terrestrial plants	H [1:1]	H [1:1]	NE	NE	L [1:1]	M [1:1]	H [1:1]	H [1:1]	H [1:1]	H [1:1]
Aquatic plants, pond	M [1:2]	M [2:2]	0 [2:2]	0 [2:2]	L [1:2]	L [2:2]	M [1:2]	M [1:2]	H [2:2]	H [2:2]
Aquatic plants, stream	M [2:2]	M [2:2]	0 [2:2]	0 [2:2]	L [2:2]	M [2:2]	M [1:2]	H [1:2]	H [2:2]	H [2:2]
Accidental Spill to a Pond										
Aquatic plants, pond	NE	H [1:2]	NE	L [2:2]	NE	H [2:2]	NE	M [1:1]	NE	H [2:2]
Off-Site Drift										
Terrestrial plants	M [5:12]	M [8:12]	NE	NE	0 [18:18]	0 [13:18]	0 [5:6]	0 [4:6]	0 [12:12]	0 [12:12]

Application Scenario	Chlorsulfuron		Fluridone		Imazapic		Overdrive		Sulfometuron	
	Typ[1]	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Special Status terrestrial plants	M [7:12]	M [7:12]	NE	NE	0 [17:18]	0 [13:18]	L [3:6]	L [4:6]	H [5:12]	H [8:12]
Aquatic plants, pond	0 [24:24]	0 [24:24]	NE	NE	0 [36:36]	0 [34:36]	0 [12:12]	0 [12:12]	L [13:24]	L [12:24]
Aquatic plants, stream	0 [24:24]	0 [22:24]	NE	NE	0 [36:36]	0 [33:36]	0 [8:12]	0 [6:12]	L [14:24]	L [10:24]
Surface Runoff										
Terrestrial plants	0 [42:42]	0 [42:42]	NE	NE	0 [42:42]	0 [42:42]	0 [42:42]	0 [42:42]	0 [42:42]	0 [42:42]
Special Status terrestrial plants	0 [42:42]	0 [42:42]	NE	NE	0 [42:42]	0 [42:42]	0 [34:42]	0 [33:42]	0 [32:42]	0 [28:42]
Aquatic plants, pond	0 [64:84]	0 [53:84]	NE	NE	0 [80:84]	0 [62:84]	0 [70:84]	0 [67:84]	L [42:84]	L [38:84]
Aquatic plants, stream	0 [80:84]	0 [77:84]	NE	NE	0 [84:84]	0 [83:84]	0 [84:84]	0 [84:84]	0 [69:84]	0 [60:84]
Wind Erosion										
Terrestrial plants	0 [9:9]	0 [9:9]	NE	NE	0 [9:9]	0 [9:9]	0 [9:9]	0 [9:9]	0 [9:9]	0 [9:9]
Special Status terrestrial plants	0 [9:9]	0 [9:9]	NE	NE	0 [9:9]	0 [9:9]	0 [9:9]	0 [9:9]	0 [9:9]	0 [9:9]
Aquatic plants, pond	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Aquatic plants, stream	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Shading denotes herbicides that are limited by PEIS Mitigation Measures to typical application rates where feasible.
1 Typ = Typical application rate; and Max = Maximum application rate.
2 Risk categories: = 0 = No risk (majority of RQs < most conservative LOC for non-Special Status species); L = Low risk (majority of RQs 1-10x most conservative LOC for non-Special Status species); M = Moderate risk (majority of RQs 10-100x most conservative LOC for non-Special Status species); H = High risk (majority of RQs >100 most conservative LOC for non-Special Status species); and NE = Not evaluated. The Risk Category is based on the risk level of the majority of risk quotients observed in any of the scenarios for a given exposure group and receptor type. See more information at the risk tables in Chapter 4 of the Ecological Risk Assessments (ENSR 2005b-k) to determine the specific scenarios that result in the displayed level of risk for a given receptor group. The number in brackets represents the number of RQs in the indicated risk category: number of scenarios evaluated.

Table C-4. BLM-Evaluated Herbicide Risk Categories for Wildlife, Fish, and Aquatic Species

Application Scenario	Chlorsulfuron		Fluridone		Imazapic		Diflufenzopyr + Dicamba		Sulfometuron	
	Typ.[1]	Max[1]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Direct Spray										
Non Special Status Species										
Small mammal – 100% absorption	0[2]	0	0	0	0	0	0	0	0	0
Pollinating insect – 100% absorption	0	0	0	0	0	0	0	0	0	0
Small mammal – 1st order dermal absorption	0	0	0	0	0	0	0	0	0	0
Fish pond	0	0	0	0	0	0	0	0	0	0
Fish stream	0	0	0	L	0	0	0	0	0	0
Aquatic invertebrates pond	0	0	0	L	0	0	0	0	0	0
Aquatic invertebrates stream	0	0	0	L	0	0	0	0	0	0
Special Status Species										
Small mammal – 100% absorption	0	0	0	0	0	0	0	0	0	0
Pollinating insect – 100% absorption	0	0	0	0	0	0	0	0	0	0
Small mammal – 1st order dermal absorption	0	0	0	0	0	0	0	0	0	0
Fish pond	0	0	0	M	0	0	0	0	0	0
Fish stream	0	0	0	L	0	0	0	0	0	0
Aquatic invertebrates pond	0	0	0	H	0	0	0	0	0	0
Aquatic invertebrates stream	0	0	0	L	0	0	0	0	0	0

Application Scenario	Chlorsulfuron		Fluridone		Imazapic		Diflufenzopyr + Dicamba		Sulfometuron	
	Typ.[1]	Max[1]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Indirect Contact with Foliage After Direct Spray										
Non Special Status Species										
Small mammal – 100% absorption	0	0	0	0	0	0	0	0	0	0
Pollinating insect – 100% absorption	0	0	0	0	0	0	0	0	0	0
Small mammal – 1st order dermal absorption	0	0	0	0	0	0	0	0	0	0
Special Status Species										
Small mammal – 100% absorption	0	0	0	0	0	0	0	0	0	0
Pollinating insect – 100% absorption	0	0	0	0	0	0	0	0	0	0
Small mammal – 1st order dermal absorption	0	0	0	0	0	0	0	0	0	0
Ingestion of Food Items Contaminated by Direct Spray										
Non Special Status Species										
Small mammalian herbivore – acute	0	0	0	0	0	0	0	0	0	0
Small mammalian herbivore – chronic	0	0	0	0	0	0	0	0	0	0
Large mammalian herbivore – acute	0	0	0	0	0	0	0	0	0	0
Large mammalian herbivore – chronic	0	0	0	0	0	0	L	M	0	0
Small avian insectivore – acute	0	0	0	0	0	0	0	0	0	0
Small avian insectivore – chronic	0	0	0	0	0	0	0	0	0	0
Large avian herbivore – acute	0	0	0	0	0	0	0	0	0	0
Large avian herbivore – chronic	0	0	0	0	0	0	0	0	0	0
Large mammalian carnivore – acute	0	0	0	0	0	0	0	0	0	0
Large mammalian carnivore – chronic	0	0	0	0	0	0	0	0	0	0
Special Status Species										
Small mammalian herbivore – acute	0	0	0	0	0	0	0	0	0	0
Small mammalian herbivore – chronic	0	0	0	L	0	0	0	0	0	0
Large mammalian herbivore – acute	0	0	0	0	0	0	0	0	0	0
Large mammalian herbivore – chronic	0	0	0	0	0	0	L	M	0	0
Small avian insectivore – acute	0	0	0	0	0	0	0	0	0	0
Small avian insectivore – chronic	0	0	0	0	0	0	0	0	0	0
Large avian herbivore – acute	0	0	0	0	0	0	0	0	0	0
Large avian herbivore – chronic	0	0	0	0	0	0	0	0	0	0
Large mammalian carnivore – acute	0	0	0	0	0	0	0	0	0	0
Large mammalian carnivore – chronic	0	0	0	0	0	0	0	0	0	0
Accidental Spill to Pond										
Non Special Status Species										
Fish pond	NE	0	NE	M	NE	0	NE	0	NE	0
Aquatic invertebrates, pond	NE	0	NE	H	NE	0	NE	0	NE	0
Special Status Species										
Fish pond	NE	0	NE	M	NE	0	NE	0	NE	0
Aquatic invertebrates, pond	NE	0	NE	H	NE	0	NE	0	NE	0
Off-Site Drift										
Non Special Status Species										
Fish, pond	0	0	NE	NE	0	0	0	0	0	0
Fish, stream	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, pond	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, stream	0	0	NE	NE	0	0	0	0	0	0

Application Scenario	Chlorsulfuron		Fluridone		Imazapic		Diflufenzopyr + Dicamba		Sulfometuron	
	Typ.[1]	Max[1]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Special Status Species										
Fish, pond	0	0	NE	NE	0	0	0	0	0	0
Fish, stream	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, pond	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, stream	0	0	NE	NE	0	0	0	0	0	0
Surface Runoff										
Non Special Status Species										
Fish, pond	0	0	NE	NE	0	0	0	0	0	0
Fish, stream	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, pond	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, stream	0	0	NE	NE	0	0	0	0	0	0
Special Status Species										
Fish, pond	0	0	NE	NE	0	0	0	0	0	0
Fish, stream	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, pond	0	0	NE	NE	0	0	0	0	0	0
Aquatic invertebrates, stream	0	0	NE	NE	0	0	0	0	0	0

Shading denotes herbicides that are limited by PEIS Mitigation Measures to typical application rates where feasible.
1 Typ = Typical application rate; and Max = Maximum application rate.
2 Risk categories: 0 = No risk (majority of RQs < most conservative LOC for non-Special Status species); L = Low risk (majority of RQs 1-10x most conservative LOC for non-Special Status species); M = Moderate risk (majority of RQs 10-100x most conservative LOC for non-Special Status species); H = High risk (majority of RQs >100 most conservative LOC for non-Special Status species); and NE = Not evaluated.
The risk category is based on the risk level of the majority of risk quotients observed in any of the scenarios for a given exposure group and receptor type. See the risk tables in Chapter 4 of the Ecological Risk Assessments (ENSR 2005b-k) to determine the specific scenarios that result in the displayed level of risk for a given receptor group.

Table C-5. BLM-Evaluated Herbicide Risk Categories for Human Health

Receptor	Diflufenzopyr			Fluridone[2]			Imazapic			Sulfometuron		
	Typ[1]	Max[1]	Accid	Typ	Max	Accid	Typ	Max	Accid	Typ	Max	Accid
Hiker/hunter (adult)	0[3]	0	0	0	0	0	NE	NE	NE	NE	NE	NE
Berry picker (child)	0	0	0	0	0	L	NE	NE	NE	NE	NE	NE
Berry picker (adult)	0	0	0	0	0	0	NE	NE	NE	NE	NE	NE
Angler (adult)	0	0	0	0	0	0	NE	NE	NE	NE	NE	NE
Residential – contaminated water (child)	0	0	0	0	0	L	NE	NE	NE	NE	NE	NE
Residential – contaminated water (adult)	0	0	0	0	0	L	NE	NE	NE	NE	NE	NE
Native American (child)	0	0	0	0	0	0	0	0	0	0	0	0
Native American (adult)	0	0	0	0	0	0	0	0	0	0	0	0
Swimmer (child)	0	0	0	0	0	0	0	0	0	0	0	0
Swimmer (adult)	0	0	0	0	0	0	0	0	0	0	0	0
Plane - pilot	NE	NE	NE	0	0	L-H	0	0	NE	0	0	NE
Plane - mixer/loader	NE	NE	NE	0	L	L-H	0	0	NE	0	0	NE
Helicopter - pilot	NE	NE	NE	0	0	L-H	0	0	NE	0	0	NE
Helicopter - mixer/loader	NE	NE	NE	0	L	L-H	0	0	NE	0	0	NE
Human/backpack - applicator/mixer/loader	0	0	NE	0	0	L-H	0	0	NE	0	0	NE

Receptor	Diflufenzopyr			Fluridone[2]			Imazapic			Sulfometuron		
	Typ[1]	Max[1]	Accid	Typ	Max	Accid	Typ	Max	Accid	Typ	Max	Accid
Human/horseback - applicator	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
Human/horseback - mixer/loader	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
Human/horseback - applicator/mixer/loader	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
ATV – applicator[4]	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
ATV - mixer/loader	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
ATV - applicator/mixer/loader	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
Truck - applicator	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
Truck - mixer/loader	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
Truck - applicator/mixer/loader	0	0	NE	0	0	L-H	0	0	NE	0	0	NE
Boat - applicator	NE	NE	NE	0	0	L-H	NE	NE	NE	NE	NE	NE
Boat - mixer/loader	NE	NE	NE	0	0	L-H	NE	NE	NE	NE	NE	NE
Boat - applicator/mixer/loader	NE	NE	NE	0	0	L-H	NE	NE	NE	NE	NE	NE

Shading denotes herbicides that are limited by PEIS Mitigation Measures to typical application rates where feasible.
1 Typ = Typical application rate; Max = Maximum application rate; and Accid = Accidental rate. Typical and maximum application rate categories include short-, intermediate-, and long-term exposures. Accidental scenario category includes accidents with herbicide mixed at both the typical and maximum application rates and with a concentrated herbicide.
2 For all worker receptors accidentally exposed to fluridone, there is low risk from exposure to solutions mixed with water to the typical application rate, moderate risk from exposure to solutions mixed with water to the maximum application rate, and high risk from exposure to concentrated solutions (prior to mixing with water).
3 Risk categories: 0 = No risk (majority of ARIs > 1); L = Low risk (majority of ARIs >1 but < 0.1); M = Moderate risk (majority of ARIs > 0.1 but < 0.01); H = High risk (majority of ARIs < 0.01); and NE = Not evaluated. The reported risk category represents the typical/most common risk level for estimated risks from various time periods. See the Vegetation Treatments Programmatic EIS Human Health Risk Assessment Final Report (ENSR 2005l) for the range of risk levels for each scenario.
4 ATV and Truck categories include spot and boom/broadcast application scenarios.

Table C-6. Forest Service-Evaluated Herbicide Risk Categories for Vegetation

	2,4-D[1]		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron		Picloram		Triclopyr[1]	
	Typ.[2]	Max[2]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Terrestrial Plants																		
Direct spray, susceptible plants	H[3]	H	H	H	H	H	H	H	NE	NE	H	H	H	H	H	H	H	H
Direct spray, tolerant plants	L	L	0	L	0	0	L	M	NE	NE	L	L	L	M	L	M	0	L
Off-site drift, low boom, susceptible plants	L [3:6]	L [3:6]	L [4:6]	M [3:6]	L [3:6]	H [3:6]	M [3:6]	M [4:6]	L [3:6]	L [4:6]	M [3:6]	H [3:6]	L [4:6]	M [4:6]	H [3:6]	H [4:6]	L [3:6]	M [3:6]
Off-site drift, low boom, tolerant plants	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [4:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]
Off-site drift, aerial, susceptible plants	NE	NE	M [2:6]	H [2:6]	M [3:6]	H [3:6]	H [3:6]	H [5:6]	NE	NE	H [5:6]	H [6:6]	M [2:6]	H [2:6]	H [6:6]	H [6:6]	M [4:6]	H [4:6]
Off-site drift, aerial, tolerant plants	NE	NE	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]	0 [5:6]	L [3:6]	NE	NE	0 [6:6]	0 [6:6]	0 [5:6]	0 [4:6]	0 [4:6]	L [3:6]	0 [6:6]	0 [5:6]
Off-site drift, backpack directed foliar, susceptible plants	0 [5:6]	0 [4:6]	NE	NE	NE	NE	L [3:6]	M [3:6]	NE	NE	M [3:6]	M [4:6]	NE	NE	M [3:6]	M [4:6]	0 [4:6]	0 [4:6]
Off-site drift, backpack directed foliar, tolerant plants	0 [6:6]	0 [6:6]	NE	NE	NE	NE	0 [6:6]	0 [6:6]	NE	NE	0 [6:6]	0 [6:6]	NE	NE	0 [6:6]	0 [6:6]	0 [6:6]	0 [6:6]
Surface runoff, susceptible plants	0 [22:30]	0 [21:30]	0 [23:30]	0 [22:30]	0 [22:30]	0 [22:30]	0	0	NE	NE	H	H	0 [21:30]	0 [18:30]	H	H	L	M
Surface runoff, tolerant plants	0 [30:30]	0 [29:30]	0 [30:30]	0 [28:30]	0 [30:30]	0 [30:30]	0	0	NE	NE	L	M	0 [25:30]	0 [22:30]	0	0	0	0
Aquatic Plants																		
Accidental spill, susceptible macrophytes	H	H	H	H	NE	NE	H	H	NE	NE	H	H	H	H	NE	NE	H	H
Accidental spill, susceptible algae	H	H	L	L	H	H	H	H	NE	NE	L	L	M	H	H	H	H	H
Accidental spill, tolerant algae	L	M	0	0	0	L	M	M	NE	NE	0	0	L	M	0	0	M	H

	2,4-D[1]		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron		Picloram		Triclopyr[1]	
	Typ.[2]	Max[2]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Acute exposure, susceptible macrophytes	M	M	0	0	NE	NE	L	L	H	H	M	H	L	L	NE	NE	0	L
Acute exposure, susceptible algae	L	L	0	0	0	L	L	L	NE	NE	0	0	0	0	L	L	M	H
Acute exposure, tolerant algae	0	0	0	0	0	0	0	0	NE	NE	0	0	0	0	0	0	0	0
Chronic exposure, susceptible macrophytes	0	L	0	0	NE	NE	0	0	M	H	M	M	0	0	NE	NE	H	H
Chronic exposure, susceptible algae	0	0	0	0	0	0	0	0	NE	NE	0	0	0	0	0	0	0	0
Chronic exposure, tolerant algae	0	0	0	0	0	0	0	0	NE	NE	0	0	0	0	0	0	0	0

Shading denotes herbicides that are limited by PEIS Mitigation Measures to typical application rates where feasible.
1 Risk categories for the more toxic formulations are presented here.
2 Typ = Typical application rate; and Max = Maximum application rate.
3 0 = No risk (HQ < LOC); L = Low risk (HQ = 1 to 10 x LOC); M = Moderate Risk (HQ = 10 to 100 x LOC); H = High risk (HQ > 100 LOC); and NE = Not evaluated. Risk categories are based on upper estimates of hazard quotients and the LOC of 1.0. If more than one scenario is involved in an exposure pathway (i.e., off-site drift and surface runoff), then the number of scenarios with the given risk category (out of the total number of evaluated scenarios) is displayed in parentheses. The reported risk category is that of the majority of the HQs for all the scenarios. As a result, risk may be higher than the reported risk category for some scenarios within each category. For more information, see the individual Forest Service Risk Assessments.

Table C-7. Forest Service-Evaluated Herbicide Risk Categories for Wildlife, Fish, and Aquatic Species

	2,4-D[1]		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron methyl		Picloram		Triclopyr[1]	
	Typ[2]	Max[2]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Mammals																		
Acute/Accidental Exposures																		
Direct spray, small mammal, 1st order absorption	0[3]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct spray, small animal, 100% absorption	L	L	L	L	0	0	0	L	L	L	0	0	0	L	0	0	0	L
Consumption of contaminated fruit, small mammal	L	L	0	0	0	L	0	L	0	0	0	0	0	0	0	0	0	L
Consumption of contaminated grass, large mammal	L	L	L	L	L	M	L	L	L	L	0	0	0	L	0	0	M	H
Consumption of contaminated water, small mammal, spill	0	0	0	0	0	L	0	0	0	0	0	0	0	0	0	0	0	0

	2,4-D[1]		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron methyl		Picloram		Triclopyr[1]	
	Typ[2]	Max[2]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Consumption of contaminated water, small mammal, stream	NE	NE	0	0	0	0	NE	NE	0	0	NE	NE	0	0	NE	NE	NE	NE
Consumption of contaminated insects, small mammal	L	L	L	L	L	M	L	L	L	L	0	0	0	L	0	0	0	L
Consumption of contaminated small mammal, predatory mammal	L	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L
Chronic Exposures																		
Consumption of contaminated vegetation, small mammal, on- site	M	M	0	0	0	0	L	L	0	0	0	0	0	0	L	M	L	M
Consumption of contaminated vegetation, small mammal, off- site	NE	NE	0	0	0	0	NE	NE	0	0	NE	NE	0	0	NE	NE	NE	NE
Consumption of contaminated vegetation, large mammal, on- site	L	L	0	L	0	0	0	0	L	M	0	0	0	0	0	L	M	H
Consumption of contaminated vegetation, large mammal, off -site	NE	NE	0	0	0	0	NE	NE	0	0	NE	NE	0	0	NE	NE	NE	NE
Consumption of contaminated water, small mammal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Birds																		
Acute/Accidental Exposures																		
Consumption of contaminated grass, large bird	0	0	0	L	L	M	0	L	L	L	0	0	0	0	0	0	L	M
Consumption of contaminated insects, small bird	0	L	0	L	L	M	0	L	L	L	0	0	0	0	0	0	L	M
Consumption of contaminated small mammal, predatory bird	0	0	0	0	0	0	0	L	0	0	0	0	0	0	0	0	0	0
Consumption of contaminated fish, predatory bird, spill	0	0	0	0	0	0	0	L	0	0	0	0	0	0	0	0	0	0
Chronic Exposures																		
Consumption of contaminated vegetation, large bird, on-site	0	0	0	L	0	0	L	L	0	0	0	0	0	0	0	L	L	M
Consumption of contaminated vegetation, large bird, off-site	NE	NE	0	0	0	0	NE	NE	0	0	NE	NE	0	0	NE	NE	NE	NE
Consumption of contaminated fish, predatory bird	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aquatic Species																		
Acute/Accidental Exposures																		
Fish (susceptible species) – accidental spill	H	H	L	L	0	L	H	H	L	L	0	L	0	L	M	M	H	H

	2,4-D[1]		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron methyl		Picloram		Triclopyr[1]	
	Typ[2]	Max[2]	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max	Typ.	Max
Fish (tolerant species) – accidental spill	L	L	0	0	0	0	M	H	0	L	NE	NE	0	0	0	L	M	H
Fish (susceptible species) – acute exposure, peak EEC	L	L	0	0	0	0	L	M	0	0	0	0	0	0	0	0	0	L
Fish (tolerant species) – acute exposure, peak EEC	0	0	0	0	0	0	0	L	0	0	NE	NE	0	0	0	0	0	0
Aquatic Invertebrates – accidental spill	0	0	L	M	L	M	M	M	L	L	0	0	0	0	0	0	L	M
Aquatic Invertebrates – acute exposure, peak EEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chronic Exposures																		
Fish – chronic exposure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aquatic invertebrates – chronic exposure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Insects																		
Acute Exposures																		
Direct spray, bee, 100% absorption	NE	NE	0	L	NE	NE	NE	NE	L	L	NE	NE	0	0	NE	NE	NE	NE
Consumption of Fruit by a Herbivorous Insect	NE	NE	NE	NE	NE	NE	0	0	NE	NE	0	0	NE	NE	0	0	0	0
Consumption of Broadleaf/Small Insects by a Herbivorous Insect	NE	NE	NE	NE	NE	NE	L	L	NE	NE	0	0	NE	NE	0	0	0	L
Consumption of Short grass by a Herbivorous Insect	NE	NE	NE	NE	NE	NE	L	L	NE	NE	0	0	NE	NE	0	0	0	L
Consumption of Tall Grass by a Herbivorous Insect	NE	NE	NE	NE	NE	NE	L	L	NE	NE	0	0	NE	NE	0	0	0	L

Shading denotes herbicides that are limited by PEIS Mitigation Measures to typical application rates where feasible.
1 Risk levels for the more toxic formulations are presented here.
2 Typ = typical application rate; and Max = maximum application rate.
3 Risk categories: 0 = No risk (HQ < LOC); L = Low risk (HQ = 1 to 10 x LOC); M = Moderate risk (HQ = 10 to 100 x LOC); H = High risk (HQ > 100 LOC); and NE = Not evaluated. Risk categories are based on upper estimates of hazard quotients and the BLM LOCs of 0.1 for acute scenarios and 1.0 for chronic scenarios. The reader should consult the text of this section of the individual Forest Service Risk Assessments to evaluate risks at central estimates of hazard quotients.
Fish susceptible species include coldwater fish, such as trout, salmon, and Federally Listed species. Fish tolerant species include warm water fish, such as fathead minnows.

Table C-8. Forest Service-Evaluated Herbicide Risk Categories for Human Health

	2,4-D[1]		Chlorsulfuron		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron		Picloram		Triclopyr	
	Typ[2]	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max
Workers																				
General Exposures																				
Directed foliar and spot treatments (backpack)	L[3]	L	0	0	0	0	0	0	0	0	0	L	0	0	0	0	0	0	0	L

	2,4-D[1]		Chlorsulfuron		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron		Picloram		Triclopyr	
	Typ[2]	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max
Broadcast ground spray (boom spray)	L	L	0	L	0	0	0	L	0	0	0	L	0	0	0	0	0	0	0	L
Aerial applications (pilots and mixer/loaders)	NE	NE	0	0	0	0	0	0	0	0	0	L	0	0	0	0	0	0	0	L
Aquatic applications	L	L	NE	NE	NE	NE	NE	NE	0	0	NE	NE	0	0	NE	NE	NE	NE	NE	NE
Accidental/Incidental Exposures																				
Immersion of hands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wearing contaminated gloves	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L
Spill on hands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spill on lower legs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Public																				
Acute/Accidental Exposures																				
Direct spray - child, entire body	0	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Direct spray - woman, lower legs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L
Dermal - contaminated vegetation, woman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L
Consumption of contaminated fruit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L
Consumption of contaminated water - pond, spill	NE	NE	0	0	0	L	0	L	NE	NE	0	0	NE	NE	0	0	NE	NE	NE	NE
Consumption of contaminated water - stream, ambient	NE	NE	0	0	0	0	0	0	NE	NE	0	0	NE	NE	0	0	NE	NE	NE	NE
Consumption of contaminated water - child	0	0	NE	NE	NE	NE	NE	NE	0	L	NE	NE	0	0	NE	NE	0	0	0	L
Consumption of contaminated fish - general public	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Consumption of contaminated fish - subsistence populations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chronic/Longer-term Exposures																				
Consumption of contaminated fruit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L

	2,4-D[1]		Chlorsulfuron		Clopyralid		Dicamba		Glyphosate[1]		Hexazinone		Imazapyr		Metsulfuron		Picloram		Triclopyr	
	Typ[2]	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max
Consumption of contaminated water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Consumption of contaminated fish - general public	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Consumption of contaminated fish - subsistence populations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Shading denotes herbicides that are limited by PEIS Mitigation Measures to typical application rates where feasible.
1 Where different formulations exist, risks reported are the most conservative.
2 Typ = Typical application rate; and Max = Maximum application rate.
3 Risk categories: 0 = No risk (majority of HQs < 1); L = Low risk (majority of HQs >1 but < 10); M = Moderate risk (majority of HQs > 10 but < 100); H = High risk (majority of HQs > 100); and NE = Not evaluated. Risk categories are based on central HQ estimates. To determine risk for lower or upper HQ estimates, see the individual herbicide Risk Assessments (SERA 2005b). Risk categories are based on comparison to the HQ of 1 for typical and maximum application rates.

Appendix D – 2015 Annual Treatment Plan

Table D-1. Three Rivers Resource Area Annual Treatment Plan

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
STATE OR COUNTY APPLICATIONS					
		State Hwy ROW		24 ac	12 miles
		Material Sites		100	3,607 ac
		Various Silvies Valley (Grant Co)		10 acres	5 miles
CONTRACT APPLICATOR					
CADR (White Top)	Warm Springs Road	Drewsey - Warm Springs Res	393, 1143-1150, 1152	100	1,000
CADR (White Top)	WS Roads	Drewsey - River Pasture Roads		100	300
CADR (White Top)	Carey Tables Pasture	Carey Tables Pasture	2352	10	1,000
CADR (White Top)	Dawson Butte-Clay Flat	Drewsey - Stinkingwater Creek/Clay Flat	1707, 1709, 1710, 1652, 1653, 1655 (+468 5 acres), 742, 1640, 1652, 1657, 1689, 1691, 1707	30	1,300
CADR (White Top)		Harney Lake, Weed Lake Ditch	1975	1	4
CADR (White Top)	Glenn Harris Hill	Drewsey		50	80
CADR (White Top)	House Butte - S Lower	Drewsey - House Butte Pasture near Hwy		10	200
CEDI3 (Diffuse Knapweed)	Lost Lake WH and rds	Above Fay Canyon	site never recorded	5	50
CEDI3 (Diffuse Knapweed)	Radar Hill ATV Area	Radar Base ORV Area		5	6,000
CIAR (Canada Thistle)	Kiger Viewing Rd	Happy Vly -Kiger Viewing Rd		20	50
CIAR/CIVU(Canada & Bull Thistle)	Otis Valley Forest	Drewsey - N end Otis Vly		100	1,000
CIAR/CIVU(Canada & Bull Thistle)	Alder Creek Meadow	Stinkingwater Mtns	2367	5	60
CIAR/CIVU(Canada & Bull Thistle)	LCC 4	Stinkingwater Mtns			113
CIAR/CIVU(Canada & Bull Thistle)	ACM 1	Stinkingwater Mtns			89
CIAR/CIVU(Canada & Bull Thistle)	Mud Flat 1	Stinkingwater Mtns			133
CIAR/CIVU(Canada & Bull Thistle)	Buzzard 2 & 3	Stinkingwater Mtns			201
CIAR/CIVU(Canada & Bull Thistle)	Crane Crk 7	Stinkingwater Mtns			137
CIAR/CIVU(Canada & Bull Thistle)	Miller Cyn 3, 4, & 5	Stinkingwater Mtns			118
CIAR/CIVU(Canada & Bull Thistle)	Mahon Cr 1 (the basin)	Stinkingwater Mtns			71
LELA2 (Pepperweed)	Chickahominy	Riley - Chickahominy Rec Area	1128	20	500

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
LELA2 (Pepperweed)	Diamond Craters	Diamond - Diamond Craters	1243, 1220-1223, 1217-1219, 1127, 1036, 1037	125	2,000
LELA2 (Pepperweed)	South Fork Malheur River - Dunnean	Venator - South Fork Malheur River		4	23
LELA2 (Pepperweed)	Stinkingwater Creek N	Drewsey - Stinkingwater Creek/Clay Flat		5	832
ONAC (Scotch Thistle)	Dawson Butte Roads	Drewsey - Dawson Butte Allot		25	200
ONAC (Scotch Thistle)	Dawson Butte_Clay Flat	Drewsey	1685, 1686, 1293, 743, 1650, 1648, 1646, 1708, 1097, 1096	5	18.5
SAAE (Medsage)	Dawson Butte Roads	Drewsey - Dawson Butte Allot	2322, 2323	2	200
STAFF APPLICATIONS					
		BLM Secondary Road Networks & Portions of 3R RA			
ACRE3 (Russian Knapweed)	Dunbar Property, etc	Middle Silvies Sites 606 & 1210	606 & 1210	0.2	25
ACRE3 (Russian Knapweed)	Emmerson ACRE	Crane - Emmerson Allotment	1070	0.1	1
ACRE3 (Russian Knapweed)	Skull Creek Road	Skull Creek Road	1055	0.2	1
ACRE3 (Russian Knapweed)	Moon Reservoir	Moon Dam	1240	0.01	0.5
ACRE3 (Russian Knapweed)	Hat Butte & Sheep Lake-Shields Roads	Riley - Hat Butte Roads	1203, 1206, 1233, 1252, 1253-1255, 1259, 1260	0.5	19,260
ACRE3 (Russian Knapweed)	Venator - Road Flat Field	Venator - Road Flat Field		15	100
ACRE3 (Russian Knapweed)	BLM Horse Corrals	BLM Horse Corrals		0.01	1
ACRE3 (Russian Knapweed)	Buck MountainSite	Buck Mountain	2341	0.01	1
ACRE3 (Russian Knapweed)	Willie's Jack Creek Site	Jack Creek Site		0.1	1
ACRE3 (Russian Knapweed)	Dry Lake (Happy Valley)	Dry Lake (Happy Valley)		0.1	2
ACRE3 (Russian Knapweed)		Holmes Canyon (?? Check Out)		0.01	
CADR (White top)	Otis Mountain PVT	Drewsey		40	
CADR (White top)	Foster Flat Road	Foster Flat Road	386, 1112, 1061, 1062	0.1	10
CADR (White top)	RD	Across (S) from Drewsey Rd			
CADR (White top)	Stinkingwater Access Road	Stinkingwater Access Road	1137-1138, 1158-1159, 1165, 1779	5	870
CADR (White top)		House Butte Allotment	1271, 2372, 1666, 1695, 1696	10	
CADR (White top)	Happy Valley - Smyth Ranch Rd	Happy Valley - Smyth Ranch Rd		1	6
CADR (White top)	Skull Creek Road	Skull Creek Road		1	1,440
CADR (White top)	Capehart Lake & Cluster Roads	Capehart Lake & Cluster	2354, 2353	0.25	1
CADR (White top)	Muddy Creek Hunt Camp	Pine Creek-ish Area		5	80

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
CADR (White top)	Chalk Hills Allot	Chalk Hills _ Road network		5	9,620
CADR (White top)	River - Drinkwater Pasture	Drewsey - on upper tables in pasture	2351	1	50
CADR (White top)	Hayes Allotment	Hayes - Below Dam etc (Silves)	2360	0.1	2,863
CADR (White top)	Clemens Land Exchange (Dry Mt - Riley)	Clemens Land Exchange (Dry Mt - Riley)	2366	0.001	
CADR (White top)	Shelly_Rim	Shelly Allotment - Rim Pasture	Exclosure	0.2	5
CEBI2 (Spotted Knapweed)	Glass Butte	Riley - Glass Butte	336	5	13,000
CEBI2 (Spotted Knapweed)	Hat Butte Roads	Riley - Hat Butte Roads	1203, 1206, 1233, 1252-1255, 1259, 1260	1.3	250
CEBI2 (Spotted Knapweed)	Horton Mill Allotment	off Horton Mill Rd - Lisa Grant		0.01	0.1
CEBI2 (Spotted Knapweed)	Dick Miller Canyon	Dick Miller Canyon		0.01	1
CEBI2 (Spotted Knapweed)	Silver Creek Bridge	Silver Creek Bridge		0.01	1
CEBI2 (Spotted Knapweed)	Coe Property	Devine Cnyn -N. of Mitch & Tammy Coe's house		0.5	15
CEBI2 (Spotted Knapweed)	Bluebucket Road	Drewsey - Bluebucket Road		0.01	275
CEDI3 (Diffuse Knapweed)	Bluebucket Road	Drewsey - Bluebucket Road N		0.5	50
CEDI3 (Diffuse Knapweed)	Chickahominy	Chickahominy Rec Area		5	200
CEDI3 (Diffuse Knapweed)	Happy Valley knapweed	Happy Valley		2	2,500
CEDI3 (Diffuse Knapweed)	ECRU Site - Hwy 20 W	Hwy 20 W of Sagehen Rest Area MP110-112ish	299-300	0.5	376
CEDI3 (Diffuse Knapweed)	East Davies - Lower	Princeton - East Davies Allotment	1051	0.2	250
CEDI3 (Diffuse Knapweed)	Egley	Halfway Reservoir (W) (Pine Springs Burn Area)		0.01	5
CEDI3 (Diffuse Knapweed)	Egley	Badger Springs Hunt Camp		0.1	5
CEDI3 (Diffuse Knapweed)	Powerline Reservoir	off Skull Creek Road		2	5
CIAR/CIVU(Canada & Bull Thistle)	Pine Crk_Greele	Pine Crk Allot - Greele Pasture		0.5	5
CIAR (Canada Thistle)	Jones Dripp Springs	Van		0.5	3
CIAR (Canada Thistle)	Coleman Creek Headwaters	Coleman Creek 1 - Stinkingwaters	2336	1	5
CIAR (Canada Thistle)	Poison Creek Reservoir	Poison Creek Reservoir		0.1	10
CIAR (Canada Thistle)	Skiddoo Spring and Ross Cabin Rd	5 Creeks		2	25
CIAR (Canada Thistle)	Riddle Lookout Rd	Riddle Mtn		0.2	67
CIAR (Canada Thistle)	Lower Muddy	Pine Creek area - from Ronda Purdy		0.5	1
CIAR (Canada Thistle)	Schoolhouse_Upper Mtn	near Little Muddy Creek - from Ronda Purdy		0.2	1
CIAR (Canada Thistle)	Thorn Spring	E. of Double O Hdqtrs		1	5
CIAR (Canada Thistle)	RX_Black Rock (Mtn Creek)	Silvies Valley		1	176

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
CIAR (Canada Thistle)	E Crk-Pine Hill - Schoolhouse	E Crk-Pine Hill - Silvies Valley		2	15
CIAR (Canada Thistle)	Dusenberry Road	Capehart Lake & Cluster		2	5
CIAR (Canada Thistle)	Moon Reservoir	Moon Reservoir - Riley		2	13
CIAR (Canada Thistle)	Shelly_Rim	Shelly Allotment - Rim Pasture	Exclosure	0.2	5
CIAR (Canada Thistle)	Voltage Well 1	Princeton - Diamond Seedings		3	25
CIVU (Bull Thistle)	Maitland Spr 2 or Silvies 2 Excl	Loco Springs (Silves Valley)		5	36
CIVU (Bull Thistle)	Jones Dripp Springs	Van		1	1
CYOF (Houndstongue)		SHED		5	500
CYOF (Houndstongue)	Silves Valley	Silves Valley Area		3	25
ELAN (Russian Olive)	Seiloff Dike	E. of Double O Hdqtrs		10	50
HYNI (Black Henbane)	Broken Pipe Spring	Drewsey		2	48
LELA2 (Pepperweed)	Stinkingwater Ck N	Drewsey -Stinkingwater Ck/Dawson Butte	1056, 1639	0.5	10
LELA2 (Pepperweed)	Moon Reservoir	Moon Reservoir - Riley	1239	0.1	13
LELA2 (Pepperweed)	Malheur Lake Near Black Butte	Malheur Lake Near Black Butte	1972	0.001	1
LELA2 (Pepperweed)	Dry Lake (Happy Valley)	Dry Lake (Happy Valley)		0.1	5
LELA2 (Pepperweed)	Ross Springs	E. of Double O Hdqtrs		4	95
LIDA (Dalmation Toadflax)	Burns Butte Shooting Range	Burns Butte Shooting Range		2	50
LIDA (Dalmation Toadflax)	Alec Butte near Big Stick	Riley	1969	0.01	1
LIDA (Dalmation Toadflax)	Egley	Sagehen Hill Along Road	1974	0.001	
LIDA (Dalmation Toadflax)	Prather Creek	Front Range		20	
LIDA (Dalmation Toadflax)	Dick Miller Canyon	Riley - Dick Miller Canyon		20	508
LIDA (Dalmation Toadflax)	Egley	Fred Taylor Sagehen Site		0.1	
LIDA (Dalmation Toadflax)	Forks of Poison Creek	Front Range	2358	5	
LIDA (Dalmation Toadflax)	Stinkingwater Creek S	Drewsey - Stinkingwater Creek S of Hwy 20		2	160
LIDA (Dalmation Toadflax)	Bluebucket Road	Drewsey - Bluebucket Road	2325	0.001	1
LIDA (Dalmation Toadflax)	Coffeepot Creek	Front Range	2344	0.01	110
LIDA (Dalmation Toadflax)	Hayes Allotment	Silvies River - Below Dam etc	2359, 2361	0.001	
LIDA (Dalmation Toadflax)	Horton Mill Allotment	Up 47 Rd	2326	0.001	35
LIDA (Dalmation Toadflax)	Dawson Butte_Clay Flat	Drewsey	2321	1	240
LIDA (Dalmation Toadflax)	Jones Dripp Springs	Van		0.1	2
LIDA (Dalmation Toadflax)	Willie's Patches	Off Lone Pine Road		1	5
LIDA (Dalmation Toadflax)	Willie's Patch	Weaver Lake Allotment		0.1	5
LYSA (Purple Loosestrife)	Stinkingwater Creek and N	Drewsey -Stinkingwater Creek		2	120

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
ONAC (Scotch Thistle)		Upton Mountain near Buskirk Spring off Warm Spring Road	1977	0.1	2
ONAC (Scotch Thistle)	Wheeler Basin Res's	Wheeler Basin Allot			
ONAC (Scotch Thistle)	Roadside Reservoirs	Drewsey (Upton Mt. Allot)		2	15
ONAC (Scotch Thistle)	Chalk Hills Roads	Drewsey - Chalk Hills Allotment		5	1,000
ONAC (Scotch Thistle)	Shelly_Road	Shelly Allotment - Road Pasture		10	640
ONAC (Scotch Thistle)	Shelly_Rim	Shelly Allotment - Rim Pasture	Exclosure	0.2	5
ONAC (Scotch Thistle)	Bear Cat Spring	Drewsey - Dawson Butte		2.5	30
ONAC (Scotch Thistle)	Broken Pipe Spring	Drewsey		2	48
ONAC (Scotch Thistle)	Adobe Flat Wells			0.2	1
ONAC (Scotch Thistle)	Egley	Pine Spring Road		3	?
ONAC (Scotch Thistle)	Egley	Gove Canyon Road		2	?
ONAC (Scotch Thistle)	Plateau Field	Diamond - across from Diamond Lane	604	0.5	100
ONAC (Scotch Thistle)	Warm Springs Road	Warm Springs Road		25	765
ONAC (Scotch Thistle)	Pine Creek Allotment	Pine Creek Allotment	2329-2333	2	2
ONAC (Scotch Thistle)	Dole-Smith Homestead	Dole-Smith Allotment	2182	2	50
ONAC (Scotch Thistle)	Tule Spring	Drewsey - Mountain Allot	2356	0.01	2
ONAC (Scotch Thistle)	Jones Dripp Springs	Van		0.2	1
ONAC (Scotch Thistle)	Warm Sprgs-Stink Rd	Stinkingwater Mountains		10	1,000
ONAC (Scotch Thistle)	Beede Desert Mine Road (esp overlooking Cottonwood Res and N. of Mine area)	Drewsey - Beede Desert		5	200
ONAC (Scotch Thistle)	Voltage Well 1	Princeton - Diamond Seedings		3	25
ONAC (Scotch Thistle)	Kingsbury Gulch	Drewsey - near Mine Turn-off Rd	1685	2	300
ONAC (Scotch Thistle)	Rattlesnake Creek	Lower 28 Rd		1	10
SAAE (Medsage)	Cooler_Road	Drewsey - Cooler Allot	392	5	1,200
SAAE (Medsage)	Bluebucket Road Hunt Camp	Drewsey - Bluebucket Rd	950	0.1	5
SAAE (Medsage)	Dawson Butte_Clay Flat	Drewsey	1642, 1643, 1647, 1660, 1682, 1084, 1649, 1651, 1658	2	18.5
SAAE (Medsage)	Riddle Lookout Road	Happy Valley - Riddle LO Road		0.2	67
TAPA4 (Tamarix)		Below Upton Cabin - 5 plants	2355	0.001	
TAPA4 (Tamarix)		N. of WS Reservoir - Check Again Not Found 2008		0.001	
BIOLOGICAL CONTROLS					
CEDI3 (Larinus minutus)	Fay Canyon	Double O -Fay Canyon and Beyond	MONITOR	45	275

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
CIAR - (Ceutorhynchus litura)	Pony Moore Spring	Riddle Mtn_P-Pasture	NEW		

Table D-2. Andrews Resource Area Annual Treatment Plan

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
STATE OR COUNTY APPLICATIONS					
		County Roads		238 ac	119 miles
		State Hwy ROWs		22 ac	11 miles
		Materials Sites - 4 sites		15	68
CONTRACT APPLICATOR					
ACRE3 (Russian Knapweed)	Powerline-Windmill	Tum Tum and Sandhill Allotments	515, 765, 772, 1086	200	15,000
ACRE3 (Russian Knapweed)	Trout Creek Driveway	Trout Creek Ranch (Driveway, etc.)		5	182
ACRE3 (Russian Knapweed)	Williams Creek	Fields - Williams Creek	1201	10	1,500
CIAR/CIVU(Canada & Bull Thistle)	Refuge West 205	Hwy 205 N of French Glen			610
LELA2 (Pepperweed)	Tum Tum ACEC	Tum Tum Lake	233, 355, 435	50	2,029
LELA2 (Pepperweed)	Williams Creek	Fields - Williams Creek	(E) 554 (W) 555	10	1,500
LELA2 (Pepperweed)	Trout Creek Driveway	Trout Creek Ranch (Driveway, etc.)	435	5	182
LELA2 (Pepperweed)	South Pocket FFR	Across from Trout Crk Ranch (Caseys)	435	5	40
ONAC (Sctoch Thistle)	Pass Creek	N of Fields - creek area	445	30	105
ONAC (Sctoch Thistle)	Pass Creek Basin	N of Fields	1727	2,000	4,500
ONAC (Sctoch Thistle)	Williams Creek	Fields - Williams Creek	(E) 325, 1261 (W) 556	20	1,500
ONAC (Sctoch Thistle)	Williams Creek - W of Hoagland's	Fields - Williams Creek	1273	10	100
HERBICIDE TREATMENTS BY STAFF					
		Secondary BLM Road Network		50	
ACRE3 (Russian Knapweed)	Domingo Pass Road	S of Fields - Domingo Pass Road	780	0.5	1,228
ACRE3 (Russian Knapweed)	Obradovich Site	off Domingo Pass Rd		0.2	1
ACRE3 (Russian Knapweed)	Arizona Creek	S of Fields - Arizona Creek	774	0.5	1
CADR (White Top)	Antelope Seeding WT	Trout Crk Mtn Rd	762	0.5	
CADR (White Top)	Calderwood Desert Rd	Tule Springs Allotment	574	1	
CADR (White Top)	Arizona Creek	S of Fields - Arizona Creek	428, 429, 430, 1226, 1249	0.3	1
CADR (White Top)	Middle Reservoir	(Fields Basin on main road)	575, 581, 1242	0.5	
CADR (White Top)	Frenchglen Dump	Above (S) Frenchglen	671	1	40
CADR (White Top)	Denio Creek	(go w/Bill Mosier - horseback access) (Small Sites as Approp)		2	5

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
CADR (White Top)	Long Hollow FFR	Long Hollow FFR	2342, 2343	0.01	
CEBI2 (Spotted Knapweed)	Frenchglen Dump	Above (S) Frenchglen	669	0.2	40
CESO3 (Starthistle)	Arizona Creek	S of Fields - Arizona Creek	16	0.01	5
CIAR (Canada Thistle)	Trout Creek Mtn Allotment (Springs)	Trout Creek Allotment	also Stony Spring Fire	5	500
CIAR (Canada Thistle)	Stergen Meadow	Trout Creek Allotment		5	40
CIAR/CIVU (Canada/BullThistle)	Scott Miles' Site	near Walls Lake - (W of Rock Creek)		5	40?
CIVU (Bull Thistle)	West Pueblos	OR End Ranch area	1917, 1918	50	500
LELA2 (Pepperweed)	Funnel Canyon	Funnel Canyon	553	0.1	177
LELA2 (Pepperweed)	Power Line Road	NE of Fields	776	0.1	20
LELA2 (Pepperweed)	Arizona Creek	S of Fields - Arizona Creek	521, 775	0.1	1
LIDA (Dalmation Toadflax)	Ten Cent Meadow	Up Arizona Crk Rd		0.1	1
ONAC (Scotch Thistle)	Funnel Canyon	Funnel Canyon	449	0.25	177
ONAC (Scotch Thistle)	Middle Reservoir	(Fields Basin on main road)	373, 1194	0.1	
ONAC (Scotch Thistle)	Polluck Winter Pasture	off East Steens Rd	2324	1	5000
ONAC (Scotch Thistle)	Stonehouse Canyon	E Steens Rd - Stonehouse Crk area	2335	2	132
ONAC (Scotch Thistle)	Stonehouse Seeding	Stonehouse Seeding	378, 641	50	8,048
ONAC (Scotch Thistle)	Fields Basin	Stonehouse Seeding		50	8,048
ONAC (Sctoch Thistle)	Juniper Lake	Juniper Lake		1	10
SAAE (Medsage)	Frenchglen Dump	Above (S) Frenchglen	668	2	40
TAPA4 (Tamarix)		Alvord Lake - 1 plant		0.001	
TRTE (Puncture Vine)	Cottonwood Creek Rd	S of Fields - Cottonwood Crk Rec Area	583	5	
BIOLOGICAL CONTROL TREATMENTS					
CIAR (Canada Thistle)		Krumbo Creek CAN Thistle Sites			

Table D-3. Steens Mountain CMPA Annual Treatment Plan

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
STATE OR COUNTY APPLICATIONS					
		County Roads		0	0
		State Hwy ROWs		0	0
		Material Sites - 5 Sites		20	446
CONTRACT APPLICATOR					
CEDI3 (Diffuse Knapweed)	Miranda Flats- Little McCoy Creek	East side of Steens	1906-1908, 1910, 1911, 1919	25	6,297
CIAR4 (Canada Thistle)	Mann Lake	East side of Steens		40	417
CIAR4 (Canada Thistle)	Riddle Ranch	Riddle Ranch		10	1,114

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
CIAR4 (Canada Thistle)	Dry Krumbo Creek	Off Moon Hill Road		15	95
CIAR4 (Canada Thistle)	Chimney	W. of Cucamonga Crk - N of Oliver			1,227
CIAR4 (Canada Thistle)	Chimney/Tackman	W. of Cucamonga Crk - N of Oliver			1,292
CIAR4 (Canada Thistle)	Oliver	W. of Cucamonga Crk - S of Chimney			5,396
CIAR4 (Canada Thistle)+ONAC	RX_Ruby Springs	Moon Hill/Krumbo Ridge (Bess Lake)		25	1,900
SAAE (Medsage)	Miranda Flats- Little McCoy Creek	East side of Steens	1978	2	200
SAAE (Medsage)	P-Hill (ODA in 2011)	Above (S) Frenchglen	265	5	1,271
HERBICIDE TREATMENTS BY STAFF					
	Steens Mountain Loop Road	**Steens Mountain Loop Road**		52	
		S. Loop - Rooster Comb (Spotted)			
		S. Loop - 7 miles in (Klamath Weed)	1939		
		S. Loop - 15.6 miles in (Starthistle - N Side of Road)			
		N. Loop - 5.5 miles E of Blitzen Bridge W. side of road (Spotted)			
		N. Loop - 7.4 miles E of Blitzen Bridge (Spotted) (.3 miles w. of wjma turnout)			
		N. Loop - 9 miles E of Blitzen Bridge (Spotted)			
		N. Loop - 1 mile in on N. Loop Road (pepperweed)			
		N. Loop - 14.6 miles E of Blitzen Bridge (Dalmation toadflax)			
CADR (White Top)	South Loop Reservoir	S. Loop Rd	52	0.1	12
CADR (White Top)	Home Creek - Blitzen	Home Creek - Blitzen	1129	1	
CADR (White Top)	Westin Mine Rd	Westin Mine + var. small sites	2346	0.001	5
CADR (White Top)	Riddle Ranch	Riddle Ranch - in horse corrals		0.2	2
CEST8 (Spotted Knapweed)	Newton Cabin	Newton Cabin Area and rds	626	10	25
CEST8 (Spotted Knapweed)	Tabor Cabin Road	Tabor Cabin Road	1749	0.2	124
CEST8 (Spotted Knapweed)	Blitzen Crossing	Blitzen Crossing - flat N of bridge		0.2	2
CEST8 (Spotted Knapweed)	Wildhorse Wilderness Area	Lillebo Site	2345	0.1	1
CEST8 (Spotted Knapweed)	Wildhorse Wilderness Area	Wildhorse Creek overlook - Ruin Sping	2346, 2347, 1979, 1913	2	10
CEST8 (Spotted Knapweed)	Wildhorse Wilderness Area	Wildhorse Creek overlook - E. of Ankle Creek		0.1	1

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
CEST8 (Spotted Knapweed)	L.Otley's EDRR	5 Crks2_Happy Valley		0.5	25
CEST8 (Spotted Knapweed)	Westin Mine Rd	near top of road by mine	1979	0.001	0.1
CEDI3 (Diffuse Knapweed)	Blitzen Road CEDI3	W of Blitzen River - E of Kamper Corral	587, 1116	0.01	2
CEDI3 (Diffuse Knapweed)	Mann Lake	Mann Lake (Boat Launch Area)		0.1	5
CIAR4 (Canada Thistle)	Whiskey Creek Reservoir	Whiskey Creek Rd - E of Moon Hill Rd	752	1	5
CIAR4 (Canada Thistle)	Upper Krumbo Crk	Upper Krumbo		2	10
CIAR4 (Canada Thistle)	Little Blitzen	Little Blitzen River - W of Riddle Ranch	444, 1213, 1214, 1216, 1225, 1256	2	25
CIAR4 (Canada Thistle)	Penland Meadow Rd	Steens Wilderness (East)		0.2	5
CIAR4 (Canada Thistle)	Blitzen Crossing (S. of Bridge)	Blitzen Crossing (S. of Bridge)		0.1	1
CIAR4 (Canada Thistle)	Desert Meadow Dam	N of Riddle Ranch		1	5
CIAR4 (Canada Thistle)	Road Pasture 4	15 Cent Lake	1864	5	5,010
CIAR4 (Canada Thistle)	P-Hill Waterhole	P-Hill/Twin Waterholes		2	209
CIAR4 (Canada Thistle)	Fish Lake CIAR4	Fish Lake Rec Area		0.2	40
CIAR4 (Canada Thistle)	Muddy Ankle Crks	Muddy Ankle Crks		20	10,037
CIVU (Bull Thistle)	South Steens Campground	South Steens Campground		0.2	37
HYPE (St. Johnswort)	HYPE Above Jackman Park	Above Jackman Park		0.01	0.1
LELA2 (Pepperweed)	North Loop LELA2	Sherbourne's Site (2)		0.2	856
LELA2 (Pepperweed)	Page Springs Campground	Page Springs Campground		2	40
LELA2 (Pepperweed)	Mann Lake	Mann Lake	788, 1121	10	417
LIVU2 (Yellow Toadflax)	Fish Lake LIVU2	Fish Lake Rec Area	593	0.001	0.1
ONAC (Scotch Thistle)	S. Loop/Hwy 205 Junction Area	S. Loop/Hwy 205 Junction Area	1813-1816, + All in secs 5, 6, 7, 8, 18	5	1,000
ONAC (Scotch Thistle)	Moon Hill Road	Moon Hill Road	357, 358, 752, 755, 763, 789, 1267, 1809	1	1,000
ONAC (Scotch Thistle)	South Loop Reservoir	S. Loop Rd		0.5	12
ONAC (Scotch Thistle)	State Pickup Res 2	N of South Loop Reservoir		0.5	3
ONAC (Scotch Thistle)	Lauserica Reservoirs	Lauserica Rd and reservoirs along it	1728, 1729, 1129	2	572
ONAC (Scotch Thistle)	Home Creek #3 Reservoirs	Off Lauserica Rd	2319, 2362, 2363, 2364, 2365	2	10
ONAC (Scotch Thistle)	Miranda Creek and Vicinity	Miranda Creek and Vicinity	1475, 1926, 1847, 1848, 1854	2	25
ONAC (Scotch Thistle)	Road Pasture 4	15 Cent Lake Area	1822, 1857	3	5,010
ONAC (Scotch Thistle)	Pike Fire	E Steens - near Pike Crk		0.1	77
ONAC (Scotch Thistle)	Carlson Creek Road	Carlson Creek Road (Wilderness Area)	369, 611, 1468, 1484, 1471, 1472,	5	195
ONAC (Scotch Thistle)	Bone Creek Area	Bone Creek Road & surroundings	612, etc	5	1,927

Weed	Treatment Area Name	Location	Site Number	Treatment Acres	Project Acres
ONAC (Scotch Thistle)	Fields_Miner's Field #2	Miner's Field #2 (Pueblo Fire NE)	2340	2	12,000
ONAC (Scotch Thistle)	Westin Mine Rd	Westin Mine side roads	2370	0.01	50
SAAE (Medsage)	P-Hill	Above (S) Frenchglen	265	5	1,271
SAAE (Medsage)	Pedro Place	across the hwy from Pedro Place		0.1	2
TAPA4 (Tamarix)	Mann Lake (6 plants)	E Steens - Mann Lake Rec Site		1	417
BIOLOGICAL CONTROL TREATMENTS/MONITORING					
1. Various south end locations for Canada Thistle agents including new areas on the Blitzen near Ankle Creek and approx 1 mile downstream from the confluence of the mainstem and Little Blitzen. Include Little Blitzen Gorge. Include 5 Creeks - East side					
2. Monitor Larinus minutus release on diffuse knapweed on BLM at the Grant Place.					
3. Newton Cabin CIAR and downstream.					

Appendix E - Invasive Plant Species Infestation Size

Existing Documented Sites (Category 1)

The Burns District has 23 invasive plant species[9] occupying approximately 26,000 acres in approximately 6,856 separate documented locations. These sites are primarily located along roads, in riparian areas, wetlands, recreation sites, range water development sites, and previously disturbed areas.

Most Category 1 invasive plant sites on the Burns District are relatively small.

Table E-1. Invasive Plants by Infestation Size

Acre Range	Common Name	Number of Sites	Total Acres
< 0.001	black henbane	5	0.0021
	bull thistle	328	0.2006
	Canada thistle	820	0.5480
	Dalmatian toadflax	84	0.0388
	diffuse knapweed	22	0.0098
	field bindweed	3	0.0015
	houndstongue	10	0.0072
	Mediterranean sage	8	0.0042
	musk thistle	4	0.0029
	nightshade	1	0.0002
	perennial pepperweed	24	0.0100
	puncturevine	2	0.0008
	purple loosestrife	9	0.0064
	Russian knapweed	9	0.0045
	saltcedar	1	0.0007
	Scotch thistle	239	0.1511
	spotted knapweed	39	0.0074
	St. Johnswort	3	0.0004
	tamarisk	7	0.0024
	tansy ragwort	3	0.0007
	whitetop	35	0.0204
	yellow starthistle	3	0.0013
		1,659	**1.0215**
0.001-0.099	black henbane	6	0.1279
	bull thistle	1,062	20.9385
	Canada thistle	1,732	27.0232
	Dalmatian toadflax	234	5.3063
	diffuse knapweed	27	0.7152
	Dyer's woad	1	0.0018
	field bindweed	18	0.4000
	houndstongue	66	1.3049
	Mediterranean sage	10	0.1246
	musk thistle	5	0.0438
	perennial pepperweed	44	0.8114
	puncturevine	1	0.0195
	purple loosestrife	4	0.0117

[9] Not counting invasive annual grasses medusahead rye, cheatgrass, and ventenata.

Acre Range	Common Name	Number of Sites	Total Acres
	Russian knapweed	51	0.9378
	Russian olive	1	0.0068
	Scotch thistle	367	8.0709
	spotted knapweed	40	1.0616
	St Johnswort	1	0.0084
	St. Johnswort	5	0.0180
	tamarisk	2	0.0040
	tansy ragwort	3	0.0128
	whitetop	235	6.7858
	Total	**3,915**	**73.7349**
0.1-0.49	black henbane	3	1.0664
	bull thistle	151	36.1673
	Canada thistle	104	23.7936
	Dalmatian toadflax	39	8.4970
	diffuse knapweed	2	0.3278
	field bindweed	1	0.2793
	halogeton	2	0.6524
	houndstongue	17	3.0543
	Mediterranean sage	3	1.1258
	musk thistle	1	0.2583
	perennial pepperweed	10	2.0228
	Russian knapweed	6	1.2731
	Russian olive	1	0.1695
	Scotch thistle	105	26.8855
	spotted knapweed	4	1.1006
	whitetop	59	15.6536
	Total	**508**	**122.3273**
0.5-0.99	black henbane	1	0.5745
	bull thistle	25	19.1757
	Canada thistle	26	18.9734
	Dalmatian toadflax	15	10.6169
	diffuse knapweed	3	2.8590
	field bindweed	1	0.6883
	Mediterranean sage	3	2.1939
	perennial pepperweed	1	0.9020
	Russian knapweed	2	1.4252
	Scotch thistle	33	23.7990
	spotted knapweed	4	3.3655
	whitetop	10	7.6495
	yellow starthistle	2	1.6452
	Total	**126**	**93.8679**
1-4.99	bull thistle	92	209.1868
	Canada thistle	65	142.7300
	Dalmatian toadflax	20	62.5121
	diffuse knapweed	14	38.2203
	field bindweed	2	3.9156
	halogeton	6	15.5367
	houndstongue	3	7.4875
	Mediterranean sage	4	9.5119
	perennial pepperweed	12	30.8127
	Russian knapweed	5	10.8928
	Scotch thistle	74	183.1510
	spotted knapweed	9	25.6154
	St. Johnswort	1	1.8667

Acre Range	Common Name	Number of Sites	Total Acres
	tamarisk	1	3.3612
	whitetop	32	70.5676
	Total	**340**	**815.3683**
5-19.99	bull thistle	43	412.8202
	Canada thistle	33	351.0457
	Dalmatian toadflax	11	89.4601
	diffuse knapweed	8	68.0190
	halogeton	4	37.8145
	houndstongue	2	22.3728
	Mediterranean sage	4	33.3125
	perennial pepperweed	6	50.8390
	puncturevine	1	7.7239
	Russian knapweed	1	9.1328
	Russian olive	1	10.0249
	Scotch thistle	43	445.0591
	spotted knapweed	8	60.9804
	whitetop	8	67.1639
	yellow starthistle	1	5.5402
	Total	**174**	**1,671.3089**
20-99.99	bull thistle	27	1,088.4179
	Canada thistle	26	923.5425
	Dalmatian toadflax	8	290.3366
	diffuse knapweed	1	38.5412
	houndstongue	2	61.7510
	perennial pepperweed	7	303.8614
	Russian knapweed	2	135.8470
	Scotch thistle	13	591.1300
	spotted knapweed	1	38.5412
	whitetop	12	540.7239
	Total	**99**	**4,012.6925**
100-499.99	bull thistle	11	1,849.2225
	Canada thistle	2	500.5070
	diffuse knapweed	1	123.5750
	Mediterranean sage	2	582.3441
	perennial pepperweed	4	958.5269
	Scotch thistle	2	268.6236
	spotted knapweed	1	122.4398
	whitetop	5	1,214.7919
	Total	**28**	**5,620.0310**
500-1000.99	bull thistle	1	627.4330
	Canada thistle	1	627.4330
	perennial pepperweed	1	976.8683
	Russian knapweed	1	966.1704
	whitetop	1	951.8582
	Total	**5**	**4,149.7629**
>1000	bull thistle	1	4,069.8782
	Canada thistle	1	4,069.8782
	Scotch thistle	1	1,294.0728
	Total	**3**	**9,433.8292**

Appendix F – Aquatic Restoration Biological Opinion (ARBO II) Project Design Criteria

Adopted as a Project Design Feature for fish and other aquatic species. From USDI Fish and Wildlife Service. 2013. Endangered Species Act - Section 7 Consultation Programmatic Biological Opinion for Aquatic Restoration Activities in the States of Oregon, Washington and portions of California, Idaho and Nevada (ARBO II)

1.3 Proposed Action

1.3.1 Program Administration

33. Non-native Invasive Plant Control includes manual, mechanical, biological, and chemical methods to remove invasive non-native plants within Riparian Reserves, Riparian Habitat Conservation Areas, or equivalent and adjacent uplands. In monoculture areas (*e.g.*, areas dominated by black berry or knotweed) heavy machinery can be used to help remove invasive plants. This activity is intended to improve the composition, structure, and abundance of native riparian plant communities important for bank stability, stream shading, LW, and other organic inputs into streams, all of which are important elements to fish habitat and water quality. Manual and hand-held equipment will be used to remove plants and disperse chemical treatments. Heavy equipment, such as bulldozers, can be used to remove invasive plants, primarily in areas with low slope values. (Invasive plant treatments included in this opinion are to serve BLM, USFS, and BIA administrative units until such units complete a local or provincial consultation for this activity type.)

a. **Project Extent** – Non-native invasive plant control projects will not exceed 10% of acres within a Riparian Reserve under the Northwest Forest Plan (USDA and USDI 1994b) or RHCA under PACFISH/INFISH (USDA-Forest Service 1995; USDA and USDI 1994a) within a 6th HUC/year.

b. **Manual Methods** – Manual treatments are those done with hand tools or hand held motorized equipment. These treatments typically involve a small group of people in a localized area. Vegetation disturbance varies from cutting or mowing to temporarily reduce the size and vigor of plants to removal of entire plants. Soil disturbance is minimized by managing group size and targeting individual plants.

c. **Mechanical Methods** – Mechanical treatments involve the use of motorized equipment and vary in intensity and impact from mowing to total vegetation removal and soil turnover (plowing and seed bed preparation). Mechanical treatments reduce the number of people treating vegetation. Impacts could be lessened by minimizing the use of heavy equipment in riparian areas, avoiding treatments that create bare soil in large or extensive areas, reseeding and mulching following treatments, and avoiding work when soils are wet and subject to compaction.

d. **Biological Methods** – Release of traditional host specific biological control agents (insects and pathogens) consists of one or two people depositing agents on target vegetation. This results in minimal impact to soils and vegetation from the actual release. Over time, successful biological control agents will reduce the size and vigor of host noxious weeds with minimal or no impact to other plant species.

e. **Chemical Methods –** Invasive plants, including state-listed noxious weeds, are particularly aggressive and difficult to control and may require the use of herbicides for successful control and restoration of riparian and upland areas. Herbicide treatments vary in impact to vegetation from complete removal to reduced vigor of specific plants. Minimal impacts to soil from compaction and erosion are expected.

i. **General Guidance**

(a) Use herbicides only in an integrated weed or vegetation management context where all treatments are considered and various methods are used individually or in concert to maximize the benefits while reducing undesirable effects.

(b) Carefully consider herbicide impacts to fish, wildlife, non-target native plants, and other resources when making herbicide choices.

(c) Treat only the minimum area necessary for effective control.

Herbicides may be applied by selective, hand-held, backpack, or broadcast equipment in accordance with state and federal law and only by certified and licensed applicators to specifically target invasive plant species.

(d) Herbicide application rates will follow label direction, unless site- specific analysis determines a lower maximum rate is needed to reduce non-target impacts.

(e) An herbicide safety/spill response plan is required for all projects to reduce the likelihood of spills, misapplication, reduce potential for unsafe practices, and to take remedial actions in the event of spills. Spill plan contents will follow agency direction.

(f) Pesticide applicator reports must be completed within 24 hours of application.

ii. **Herbicide Active Ingredients** – Active ingredients are restricted to the following (some common trade names are shown in parentheses; use of trade names does not imply endorsement by the US government):[10]

(a) aminopyralid (*e.g.*, *terrestrial*: Milestone VM)

(b) chlorsulfuron (*e.g.*, *terrestrial*: Telar, Glean, Corsair) (c) clopyralid (*e.g.*, *terrestrial*: Transline)

(d) dicamba (*e.g.*, *terrestrial*: Vanquish, Banvel)

(e) diflufenzopyr + dicamba (*e.g.*, *terrestrial*: Overdrive)

(f) glyphosate (*e.g.*, *aquatic*: Aquamaster, AquaPro, Rodeo, Accord) (g) imazapic (*e.g.*, *terrestrial*: Plateau)

(h) imazapyr (*e.g.*, *aquatic*: Habitat; *terrestrial*: Arsenal, Chopper)

(i) metsulfuron methyl (*e.g.*, *terrestrial*: Escort)

(j) picloram (*e.g.*, *terrestrial*: Tordon, Outpost 22K) (k) sethoxydim (*e.g.*, *terrestrial*: Poast, Vantage)

(l) sulfometuron methyl (*e.g.*, *terrestrial*: Oust, Oust XP)

(m) triclopyr (*e.g.*, *aquatic*: Garlon 3A, Tahoe 3A, Renovate 3, Element 3A; *terrestrial*: Garlon 4A, Tahoe 4E, Pathfinder II)

(n) 2,4-D (*e.g.*, *aquatic*: 2,4-D Amine, Clean Amine; *terrestrial*: Weedone, Hi-Dep)

iii. **Herbicide Adjuvants –** When recommended by the label, an approved aquatic surfactant would be used to improve uptake. When aquatic herbicides are required, the only surfactants and adjuvants permitted are those allowed for use on aquatic sites, as listed by the Washington State Department of Ecology: http://www.ecy.wa.gov/programs/wq/pesticides/regpesticides.html. (Oregon Department of Agriculture also often recommends this list for aquatic site applications). The surfactants R-11, Polyethoxylated tallow amine (POEA), and herbicides that contain POEA (*e.g.*, Roundup) will not be used.

iv. **Herbicide Carriers –** Herbicide carriers (solvents) are limited to water or specifically labeled vegetable oil.

v. **Herbicide Mixing –** Herbicides will be mixed more than 150 feet from any natural waterbody to minimize the risk of an accidental discharge. Impervious material will be placed beneath mixing areas in such a manner as to contain any spills associated with mixing/refilling. Spray

[10] The use of trade, firm, or corporation names in this opinion is for the information and convenience of the action agency and applicants and does not constitute an official endorsement or approval by the U.S. Department of the Interior or USFWS of any product or service to the exclusion of others that may be suitable.

tanks shall be washed further than 300 feet away from surface water. All hauling and application equipment shall be free from leaks and operating as intended.

vi. **Herbicide Application Methods** – Liquid forms of herbicides will be applied as follows:

(a) Broadcast spraying using booms mounted on ground-based vehicles (this consultation does not include aerial applications).

(b) Spot spraying with hand held nozzles attached to back pack tanks or vehicles and hand-pumped sprayers to apply herbicide directly onto small patches or individual plants.

(c) Hand/selective through wicking and wiping, basal bark, frill ("hack and squirt"), stem injection, or cut-stump.

(d) Dyes or colorants, (*e.g.*, Hi-Light, Dynamark) will be used to assist in treatment assurance and minimize over-spraying within 100 feet of live water.

vii. **Minimization of Herbicide Drift and Leaching –** Herbicide drift and leaching will be minimized as follows:

(a) Do not spray when wind speeds exceed 10 miles per hour to reduce the likelihood of spray/dust drift. Winds of 2 mph or less are indicative of air inversions. The applicator must confirm the absence of an inversion before proceeding with the application whenever the wind speed is 2 mph or less.

(b) Be aware of wind directions and potential for herbicides to affect aquatic habitat area downwind.

(c) Keep boom or spray as low as possible to reduce wind effects. (d) Avoid or minimize drift by utilizing appropriate equipment and settings (*e.g.*, nozzle selection, adjusting pressure, drift reduction agents, *etc.*). Select proper application equipment (*e.g.*, spray equipment that produces 200-800 micron diameter droplets [Spray droplets of 100 microns or less are most prone to drift]).

(e) Follow herbicide label directions for maximum daytime temperature permitted (some types of herbicides volatilize in hot temperatures).

(f) Do not spray during periods of adverse weather conditions (snow or rain imminent, fog, *etc.*). Wind and other weather data will be monitored and reported for all pesticide applicator reports.

(g) Herbicides shall not be applied when the soil is saturated or when a precipitation event likely to produce direct runoff to fish-bearing waters from a treated site is forecasted by NOAA National Weather Service or other similar forecasting service within 48 hours following application. Soil-activated herbicides can be applied as long as label is followed. Do not conduct any applications during periods of heavy rainfall.

viii. **Herbicide buffer distances –** The following no-application buffers— which are measured in feet and are based on herbicide formula, stream type, and application method—will be observed during herbicide applications (Table 4). Herbicide applications based on a combination of approved herbicides will use the most conservative buffer for any herbicide included. Buffer widths are measured as map distance perpendicular to the bankfull for streams, the upland boundary for wetlands, or the upper bank for roadside ditches.

Table 4. No-application buffer widths in feet for herbicide application, by stream types and application methods.

Herbicide	Perennial Streams and Wetlands, and Intermittent Streams and Roadside Ditches with flowing or standing water present			Dry Intermittent Streams, Dry Intermittent Wetlands, Dry Roadside Ditches		
	Broadcast Spraying	Spot Spraying	Hand Selective	Broadcast Spraying	Spot Spraying	Hand Selective
Labeled for Aquatic Use						
Aquatic Glyphosate	100	*waterline*	*waterline*	50	0	0
Aquatic Imazapyr	100	*waterline*	*waterline*	50	0	0

Herbicide	Perennial Streams and Wetlands, and Intermittent Streams and Roadside Ditches with flowing or standing water present			Dry Intermittent Streams, Dry Intermittent Wetlands, Dry Roadside Ditches		
	Broadcast Spraying	Spot Spraying	Hand Selective	Broadcast Spraying	Spot Spraying	Hand Selective
Aquatic Triclopyr-TEA	***Not Allowed***	15	*waterline*	***Not Allowed***	0	0
aquatic 2,4-D (amine)	100	*waterline*	*waterline*	50	0	0
Low Risk to Aquatic Organisms						
Aminopyralid	100	waterline	waterline	50	0	0
Dicamba	100	15	15	50	0	0
Dicamba+diflufenzopyr	100	15	15	50	0	0
Imazapic	100	15	*bankfull elevation*	50	0	0
Clopyralid	100	15	*bankfull elevation*	50	0	0
Metsulfuron-methyl	100	15	*bankfull elevation*	50	0	0
Moderate Risk to Aquatic Organisms						
Imazapyr	100	50	*bankfull elevation*	50	15	*bankfull elevation*
Sulfometuron-methyl	100	50	5	50	15	*bankfull elevation*
Chlorsulfuron	100	50	*bankfull elevation*	50	15	*bankfull elevation*
High Risk to Aquatic Organisms						
Triclopyr-BEE	***Not Allowed***	150	150	***Not Allowed***	150	150
Picloram	100	50	50	100	50	50
Sethoxydim	100	50	50	100	50	50
2,4-D (ester)	100	50	50	100	50	50

Appendix G – Burns District Human Health Risk Assessment Worksheets

The following risk management worksheets are contained in this Appendix:

- 2014 ATV/UTV use for invasive plant management
- 2014 Driving concerns for invasive plant management
- 2014 Environmental concerns for invasive plant management
- 2014 Herbicide use for invasive plant management
- 2014 Horseback use for invasive plant management

Form 1112-5
(May 2001)
UPDATE 11/2009 ORWA

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RISK MANAGEMENT WORKSHEET

1. Organization and Location			2. Page 1 of 3
Burns District Weed Program Hines, Oregon			
3. Operation / Task	4. Beginning Date:	5. Ending Date:	6. Date Prepared
Weed Management---ATV/6X6 Use	FY2014	Indefinite	3/3/2014

7. Prepared by *(Name / Duty Position)*
Lesley Richman - Natural Resource Specialist—Weed Management

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
All Terrain Vehicle (ATV) operation (general)			X		All ATV operators must be trained and authorized to operate ATVs prior to use		X			Operators will complete a Bureau training course in safe ATV operation and check ride with supervisor. Operators utilize SIPDE process (Search, Identify, Predict, Decide, Execute) each time they operate a machine	Supervisor ensures ATV safety training is current. Supervisor check-rides
Pre-ride checklist all OHVs		X			Conduct pre-ride check each day using list attached to machine	X				Primary operator ensures pre-ride checklist is on machine.	

14. Remaining Risk Level After Control Measures Are Implemented: (CIRCLE HIGHEST REMAINING RISK LEVEL)	**LOW** (Line Supervisor)	**MEDIUM** (Branch Chief)	**HIGH** (District Manager	**EXTREMELY HIGH** (Must be State Director/Associate)

15. RISK DECISION AUTHORITY: **(Approval/Authority Signature Block)** (If Initial Risk Level is Medium, High or Extremely High, Brief Risk Decision Authority at that level on Controls and Control Measures used to reduce risks) (**Note**: if the person preparing the form signs this block, the signature indicates only that the appropriate risk decision authority was notified of the initial risk level, control measures taken and appropriate resources requested; and that the risk was accepted by the decision authority.)

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8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Loading and Unloading			X		Loading/Unloading operation is often the most difficult part of a ride. Use longest possible ramps. Ramps must be secured to tailgate/trailer. If possible, park vehicle to reduce steepness of ramp. Keep speed constant-avoid stopping mid-operation. ATVs can be unloaded with engine off and operator off machine by rolling back in neutral (operator preference)		X			Official training, practicing loading and unloading, pre-season ride/refresher	Same as above
Cargo Hauling		X			Do not exceed rack and total vehicle capacity. Secure loads so they don't shift. For steep ascents load weight on front rack. Although steering may be slightly stiffer use front rack for smaller loads. Balance larger loads for between racks. Avoid cargo extending beyond racks in brushy terrain.		X			Same as above	Same as above
General operational hazards (includes dust, flying debris, low hanging branches, etc.)		X			ATV operator must wear minimum required PPE including DOT approved helmet, goggles, safety glasses or face shield, leather gloves, over-the-ankle boots and long sleeve shirt and long pants.	X				Bureau will provide required specialty PPE: helmet, goggles, safety glasses, face shield, and leather gloves	Supervisor provides funding for PPE
Collisions with other ATVs, vehicles, animals, etc.		X			ATV operator should reduce speed when: near other ATVs, vehicles or animals. Maintain enough stopping distance from nearest machine. ALWAYS assume another vehicle/obstacle is present on blind curves.	X				Operator should follow SIPDE process	Supervisor ensures ATV training is current
ATV trailering		X			Load ATV to front of trailer to mitigate fishtailing of trailer. Secure with 4 tie downs front to back. Practice trailer skills: backing, etc.	X				Apply SIPDE process	Supervisor conducts annual refresher with crew
Towing loads with ATV		X			Match terrain with ATV trailer load. Anticipate longer stopping distances. Do not exceed vehicle towing capacity and		X			Apply SIPDE process	Part of annual refresher with crew.

CONTINUED

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
					tongue weight. Secure loads.						
Technical trail sections: Obstacles, sidehills, steep climbs/descents, mud, etc			X		Apply SIPDE process. Listen to first instinct. Execute proper riding technique (e.g. weight shifts) AVOID if at all doubtful		X			Inexperienced operators ride with more experienced operators	Supervisor ensures ability level matches task and provides experienced rider for OJT training
Ranger UTV 6X6 operation specifics			X		Wear seat belts. Match sidehills and up/down terrain with machine capability. Use low range in rugged terrain to reserve needed power. Use spotter in limited visibility. Secure equipment in cargo box. Do not exceed cargo/vehicle weight capacities. Secure to trailer with heavy duty tie downs (not ATV/motorcycle tie downs). Wear helmet for adverse terrain and extended rides		X			Operators complete Bureau training course and check ride with supervisor	Supervisor provides training and ensures currency
Communications: UTV/6X6		X			Carry BLM radio at a minimum, radio and cell/sat phone if available	X					Supervisor provides training and ensures currency

This RA was reviewed with the following employees prior to work project _____ on _____
Date

_____ *Signature/Date*	_____ *Signature/Date*	_____ *Signature/Date*
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Form 1112-5
(May 2001)
UPDATE 11/2009 ORWA

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RISK MANAGEMENT WORKSHEET

1. Organization and Location			2. Page 1 of 2
Burns District – Weed Program Hines, Oregon			
3. Operation / Task	4. Beginning Date:	5. Ending Date:	6. Date Prepared
Weed Program: Driving Concerns	**FY2014**	**On-going**	2/26/2014

7. Prepared by *(Name / Duty Position)*
Lesley Richman - Natural Resource Specialist—Weed Management

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Driving Hazards											
Public Roadway Traffic		X			Use Defensive driving techniques at all times.	X				Bureau Defensive driving class, pre-season refresher. Operators must have valid driver's license	Supervisor arranges pre-season training

14. Remaining Risk Level After Control Measures Are Implemented: (CIRCLE HIGHEST REMAINING RISK LEVEL)	**LOW** (Line Supervisor)	**MEDIUM** (Branch Chief)	**HIGH** (District Manager	**EXTREMELY HIGH** (Must be State Director/Associate)

15. RISK DECISION AUTHORITY: **(Approval/Authority Signature Block)** (If Initial Risk Level is Medium, High or Extremely High, Brief Risk Decision Authority at that level on Controls and Control Measures used to reduce risks) (**Note**: if the person preparing the form signs this block, the signature indicates only that the appropriate risk decision authority was notified of the initial risk level, control measures taken and appropriate resources requested; and that the risk was accepted by the decision authority.)

[redacted]

Signature (RD Authority)/Date *Employee(s) Signature(s) and Date* *Safety Manager Review/Date*

CONTINUED

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Steep, narrow roads		X			-Drive cautiously so vehicle can be stopped in less than 2 vehicle lengths. -Use 4X4 on most dirt roads, especially when steep.		X			Bureau Defensive driving class, pre-season refresher. Operators must have valid state driver's license	Supervisor arranges pre-season training
Pre-ride checklist		X			Inspect vehicle before leaving the compound, test radio for proper operation (radio check with dispatch as leaving the compound), check to see if vehicle has appropriate safety items. Use Checklist.	X				Daily inspections as required by the District, utilizing the vehicle inspection list.	Supervisor arranges pre-season training

This RA was reviewed with the following employees prior to work project _____ on _____
Date

Signature/Date	*Signature/Date*	*Signature/Date*
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BUREAU OF LAND MANAGEMENT

RISK MANAGEMENT WORKSHEET

1. Organization and Location			2. Page 1 of 2
Burns District – Weed Program Hines, Oregon			
3. Operation / Task	4. Beginning Date:	5. Ending Date:	6. Date Prepared
Weed Program: Environmental / Weather Risks	**FY2014**	**On-going**	2/26/2014

7. Prepared by *(Name / Duty Position)*
Lesley Richman - Natural Resource Specialist—Weed Management

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Environmental / Weather Risks											
Heat		X			Avoid heat stress/exhaustion/stroke by STAYING HYDRATED. Treatment crews will need to drink comparable amounts of water as firefighters (minimum of 1 gallon/day). Judge hydration by frequency and color of urine.	X				Pre-season training Employee judgment and completion of First Aid and CPR	Supervisor led pre-season training.

14. Remaining Risk Level After Control Measures Are Implemented: (CIRCLE HIGHEST REMAINING RISK LEVEL)	**LOW** (Line Supervisor)	**MEDIUM** (Branch Chief)	**HIGH** (District Manager	**EXTREMELY HIGH** (Must be State Director/Associate)

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[redacted]

Signature (RD Authority)/Date *Employee(s) Signature(s) and Date* *Safety Manager Review/Date*

CONTINUED

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Cold		X			Avoid hypothermia by staying dry and carrying adequate layers.	X				Pre-season training Employee judgment and completion of First Aid and CPR	Supervisor led pre-season training.
Weather		X			WATCH weather conditions. T-storms move anywhere from 5-20 mph. Anticipate storm arrival. -Seek shelter in vehicle if possible -If caught in electrical storm avoid open areas, lone trees. Crouch in a depression (watch for flash floods)	X				Pre-season training. Employee judgment.	Supervisor conducts pre-season training

This RA was reviewed with the following employees prior to work project _____ on _____
Date

Signature/Date	*Signature/Date*	*Signature/Date*
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BUREAU OF LAND MANAGEMENT

RISK MANAGEMENT WORKSHEET

1. Organization and Location			2. Page 1 of 4
Burns District – Weed Program Hines, Oregon			
3. Operation / Task	4. Beginning Date:	5. Ending Date:	6. Date Prepared
Weed Program: Herbicide Handling and Application	**FY2014**	**On-going**	2/26/2014

7. Prepared by *(Name / Duty Position)*
Lesley Richman - Natural Resource Specialist—Weed Management

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	L	M	H	E	(Be Specific)	L	M	H	E	(Be Specific)	(Be Specific)
Herbicide Use Risks Herbicide Mixing and Handling		X			-Follow label direction **(label is the law).** -Mixing chemicals will be completed outside. -Wear appropriate PPE. -Triple rinse and destroy containers. -Lock up all herbicides in pesticide storage cabinet. -Keep adequate fresh water for spills and cleaning. -Clean sprayers in the appropriate manner. -Use truck tanks for fresh water only. First Aid: Keep first aid supplies with sprayer, MSDS sheets with sprayer	X				Employees trained via state, BLM, and in-house training. Employees are also required to become certified applicators through the BLM and meet all requirements of Oregon State DEQ.	Supervisor ensures employees are trained and certified Treatment crew leaders ensure first aid supplies and MSDS up to date.

14. Remaining Risk Level After Control Measures Are Implemented: (CIRCLE HIGHEST REMAINING RISK LEVEL)	**LOW** (Line Supervisor)	**MEDIUM** (Branch Chief)	**HIGH** (District Manager	**EXTREMELY HIGH** (Must be State Director/Associate)

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[redacted]

Signature (RD Authority)/Date *Employee(s) Signature(s) and Date* *Safety Manager Review/Date*

CONTINUED

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Weed Spraying		X			-Orient machine upwind of infestation, pull hose to patch and spray with back to wind. -Back into wind using backpack sprayers. - Follow label guidelines for soil, water, and weather conditions. - Wear appropriate PPE as per label -Check sprayers for leaks, components for proper operation. -Periodically re-calibrate sprayer for proper application rates. -Avoid unnecessary damage to non-target plants.	X				Pre-season training.	Supervisor ensures employees are trained and certified Supervisors will ensure that employees are complying with the district's check in and out procedures.
Transporting herbicides		X			-Secure containers in tool boxes away from sharp objects, not in open bed. -Use original containers when possible, or DOT approved Haz-Mat bottles (Nalgene) for smaller quantities of herbicides. Label as to contents (required). -Secure backpack sprayers with herbicides away from sharp objects.	X				Pre-season training	Supervisor ensures training as part of pre-season startup
Herbicide Storage		X			Store all herbicides and adjuvants in a lockable Pesticide Storage Shop. Store all pesticides utilizing appropriate secondary containment. -Periodically check for leaking containers.	X				Pre-season training and periodic inspections.	Supervisor/crew leaders ensure compliance.
Herbicide spills		X X			Utilize spill kit (located throughout the compound). Notify Haz-Mat coordinator and supervisor. **Contractors** – Ensure herbicides are properly contained during transport, loading, and mixing.	X X				Proper handling and storage of containers. Ensure contractors have and follow a Safety Plan that addresses safe handling of herbicides including spill containment.	Supervisor/crew leader checks.

CONTINUED

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Sprayer Storage	X				DO NOT store sprayers with herbicide mix in tank at office or facility. Clean all sprayers in the appropriate manner prior to storage.	X				Pre season training	Supervisor/crew leader checks.
Personal Protective Equipment (PPE) Requirements:											
Follow all Protective Equipment that is required on the product label.		X			MINIMUM REQUIRED PPE: Long-sleeved shirts Long pants Eye protection	X				Follow all requirements for PPE from all product labels. For tank mixes, follow most restrictive requirements.	Supervisor/crew leader checks.
Footwear requirements		X			**Rubber boots** - When mixing chemicals and when spraying operations are being conducted in areas suitable for wearing rubber boots. **Water Resistant Hiking Boots**, (must be washable) - Water resistant (water proof) hiking boots are an alternate footwear when spraying, in terrain that is rocky or steep. All hiking boots are to be machine washable, minimal leather, and water resistant. This is to minimize the amount of pesticide absorbed in the boot and minimize the amount of pesticide that can be absorbed into the skin of the foot. These boots must be dedicated strictly to spraying activities and must be removed after spraying operations are completed.					Pre-season training	Supervisor/crew leader checks.
Coveralls		X			Recommended when mixing, loading and application of all chemicals	X				Pre-season training	Supervisor/crew leader checks.
Gloves		X			Use Rubber or Latex Gloves (Unlined gloves) - Required when mixing chemicals.	X				Pre-season training	Supervisor/crew leader checks.

This RA was reviewed with the following employees prior to work project _____ on _____
Date

_____ *Signature/Date*	_____ *Signature/Date*	_____ *Signature/Date*
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Form 1112-5
(May 2001)
UPDATE 11/2009 ORWA

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RISK MANAGEMENT WORKSHEET

1. Organization and Location			2. Page 1 of 2
Burns District – Weed Program Hines, Oregon			
3. Operation / Task	4. Beginning Date:	5. Ending Date:	6. Date Prepared
Weed Program: Horseback Spraying or Packing of Herbicide	**FY2014**	**On-going**	2/26/2014

7. Prepared by *(Name / Duty Position)*
Lesley Richman - Natural Resource Specialist—Weed Management

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
Horseback Spraying or Horse Packing of Herbicide Horse utilization in the spraying of or packing of pesticides requires that all herbicides are in leak proof containers and well packed.		X			Follow strict packaging requirements for the protection of the horse and employee.	X				Packers will understand the hazards of the chemicals and provide protection	Supervisors will ensure that the applicators are trained and that proper packing procedures are adhered too.

14. Remaining Risk Level After Control Measures Are Implemented: (CIRCLE HIGHEST REMAINING RISK LEVEL)	**LOW** (Line Supervisor)	**MEDIUM** (Branch Chief)	**HIGH** (District Manager	**EXTREMELY HIGH** (Must be State Director/Associate)

15. RISK DECISION AUTHORITY: **(Approval/Authority Signature Block)** (If Initial Risk Level is Medium, High or Extremely High, Brief Risk Decision Authority at that level on Controls and Control Measures used to reduce risks) (**Note**: if the person preparing the form signs this block, the signature indicates only that the appropriate risk decision authority was notified of the initial risk level, control measures taken and appropriate resources requested; and that the risk was accepted by the decision authority.)

[redacted]

Signature (RD Authority)/Date | *Employee(s) Signature(s) and Date* | *Safety Manager Review/Date*

CONTINUED

8. Identified Hazards	9. Assess the Hazards: Initial Risk				10. Control Measures Developed for Identified Hazards: *(Specific measures taken to reduce the probability of a hazard)* **Include all PPE**	11. Assess the Hazard's Residual Risk:				12. How to Implement the Controls: (May Be Filled in By Hand)	13. Supervisors and Evaluation by: (Continuous Leader Checks, Buddy System, etc.)
(Be Specific)	**L**	**M**	**H**	**E**	**(Be Specific)**	**L**	**M**	**H**	**E**	**(Be Specific)**	**(Be Specific)**
All employees utilizing horses for the use of spraying or packing herbicides will follow all guidelines and procedures as established by the District for safe horseback activities.		X			All employees utilizing horses on district will be briefed and OK'd by the District Horse Program staff.	X				All employees utilizing horses on district will be briefed and OK'd by the District Horse Program staff.	Supervisors will ensure the briefing occurs

This RA was reviewed with the following employees prior to work project _____ on _____
Date

Signature/Date	*Signature/Date*	*Signature/Date*
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Appendix H – Weed Prevention Schedule

Table H-1. Weed Prevention Schedule

Prevention Activity	When
Conduct weed identification training for all field personnel.	Spring/Summer
Report all new noxious weed sightings during formal/informal field surveys.	All Year
Systematically inventory the District to detect new invaders and expansions of established noxious weeds.	Spring/Summer
Maintain database and GIS layers for all noxious weed locations on the District.	All Year
Assess weed potential/risk when developing project proposals. Ensure that all NEPA and planning documents include a noxious weed element for analysis. Consider degree of physical disturbance and likelihood of invasion for any proposed management action.	All Year
Address weed issues during annual construction and road maintenance planning. Mitigate spreading weeds from known sites.	All Year
Include weed prevention and eradication strategies in all Mineral Operation Plans.	All Year
Include weed risk factors and weed prevention considerations for all fire Incidents (wild or prescribed) and Fire Rehabilitations.	Summer/Fall
Work closely with Oregon Department Of Agriculture, Oregon Department of Transportation, and County Weed Board to coordinate cooperative weed control efforts.	All Year
Work with adjacent landowners on weed awareness and control strategies.	All Year
Distribute weed awareness information to the public.	All Year
Sign all developed and semi-developed recreation and camping sites for weed awareness, identification, and weed prevention techniques.	Spring/Summer/Fall
Ensure all developed and semi-developed recreation and camping sites have on-site weed control and annual weed inventory.	Spring/Summer/Fall
Consider timing of livestock movement from infested to non-infested areas to minimize weed seed transport in areas of moderate to high ecological risk.	All Year
Consider off-road vehicle closures in areas of known noxious weed infestations.	All Year
Check body and undercarriage of off-road vehicles for plant material and clean with best available method before leaving weed-infested areas.	All Year
Ensure that Force Account and Fire personnel high-pressure wash plant parts, mud, etc., from fire vehicles, road graders, and heavy equipment before leaving infested sites. Assure that permits or contracts with soil-disturbing activities have provision for sanitizing equipment prior to entering Bureau of Land Management (BLM) sites and prior to release from jobsites.	All Year
Monitor, inventory, and control noxious weeds on all mineral sites such as clay, gravel, rock pits, cinder pits or sand sites. Use material from only weed-free sources on public land.	Summer
Monitor all vegetation manipulation and revegetation projects, i.e., prescribed fire areas, timber harvest activities, ROWs, seedings, juniper control areas, OHV areas, etc., for weed infestations and initiate control efforts as needed.	Spring/Summer/Fall
Reestablish desirable vegetation in areas of soil disturbance resulting from management activities (such as road construction/maintenance, timber harvest, mining, etc.)	Fall
Use only certified weed-free seed and mulch for rangeland, habitat improvement and reclamation seedings.	All Year
Consider winter logging to prevent noxious weed spread.	Winter