Chapter 2
Alternatives

Chapter 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

Chapter 2 describes and compares alternatives considered for invasive plant treatment on the Deschutes and Ochoco National Forests and Crooked River National Grassland. Alternatives were developed by the Interdisciplinary Team to address the key issues. Three alternatives are analyzed in detail. Both action alternatives meet the purpose and need for action in varying degrees.

The descriptions of the alternatives in Chapter Two are derived from a detailed project database of existing invasive plant inventories. The project area was divided into treatment areas, called project area units, that were classified by the type of site (e.g., roads, administrative sites, meadows) and assess for the threat posed by existing invasive species and the potential for effective treatment. Treatment methods (herbicide and non-herbicide) and strategies were identified based on the location, extent and biology of the existing invasive plant species. Treatment priorities, methods and strategies are tiered to the 2005 R6 Invasive Plant FEIS. A primary outcome of the site-specific analysis is development of project design features so that invasive plant treatments minimize adverse effects to non-target plants and animals (Standards 19 & 20).

Precision of Information and Adjustments

Quantifiable measurements, such as acres and miles, and mapped unit boundaries used to describe the alternatives and effects are based on the best available information. Information used in designing the alternatives was generated from a mix of field reconnaissance, global positioning system (GPS) technology, the NRIS database[3], and the expertise of the invasive plant coordinators on the Forests and Grassland.

Adjustments have been made to the original proposal primarily based on additional site-specific information derived from ongoing field verification. Site-specific information is subject to change over time. Ongoing inventory will validate the location, extent, and species distribution of invasive plants.

2.2 Alternative Development

The interdisciplinary team used the issues described in Chapter 1 to refine the proposed action, an alternative to the proposed action, and to develop Project Design Features (PDFs) that minimize or eliminate potentially adverse effects. Aside from No Action, the alternatives do not drop any treatment areas from consideration; rather, they specify alternative means of controlling the invasive species, or require additional PDFs. Also see **Alternatives and Project Design Features Not Considered in Detail** at the end of this Chapter.

[3] The National Resource Information System (NRIS) is a set of databases that contain resource information needed to support the business of managing national forests and grasslands. NRIS holds data on vegetation, soil and geology, air and water, animal life and social and economic data. Information on local invasive plant infestations is gathered and entered into NRIS by specialists on the Forests and Grassland, including site monitoring data.

2.3 Alternatives Considered in Detail

2.3.1 Alternative 1 – No Action

This alternative is required by law and serves as a baseline for comparison of the effects of the alternatives. Under Alternative 1, there would be no change in the level of ongoing management activities within the project area. No Action means that none of the actions proposed to control invasive plant species on the Forests will take place.

Under the No Action alternative, the Forests and Grassland would continue to treat invasive plant species as authorized under existing NEPA documents. As approved by NEPA decisions, approximate acres treated over the last several years are shown in Table 3. Details on the areas treated each year are available from the Forests and Grassland Noxious Weed Program Manager.

Invasive plant treatments have been previously authorized under the following NEPA decisions:

- Ochoco National Forest and Crooked River National Grassland, Integrated Weed Management Environmental Assessment and Decision Notice (1995) allowed the Forest Service to treat 34 noxious weed sites with a mix of manual, biological, and chemical treatments. It also amended the Ochoco/Grassland LRMP to include programmatic direction for Forest Plan desired future conditions, goals, objectives, and standards and guidelines for noxious weed management. Herbicides approved for use at that time under the (1988) Record of Decision for the Guide to Conducting Vegetation Management Project in the Pacific Northwest Region and selected for use on the Ochoco were Dicamba, Picloram, and Glyphosate.
- Ochoco National Forest and Crooked River National Grassland, 1998 Integrated Noxious Weed Management Environmental Analysis and Decision Notice analyzed and authorized intensive weed management on 72 sites, with chemical, manual, and/or biological control. Based on monitoring results from the weed sites treated under the 1995 EA, the 1998 expanded the area where herbicides could be used. Only Dicamba, Picloram, and Glyphosate were proposed.
- Deschutes National Forest Noxious Weed Control Environmental Assessment and Decision Notice (USFS 1998a) authorized treatment at 98 noxious weed sites on 901 acres with manual treatment, 27 sites on 149 acres with biological agents, 1 site on 5 acres with prescribed burning, and 40 sites on 476 acres with herbicides. Only Dicamba, Picloram, Glyphosate, and triclopyr were proposed.
- Turnpike Pit Medusahead Control, Environmental Assessment and Decision Notice (2005c) authorized herbicide treatment (Glyphosate) of medusahead at the Turnpike Pit material source (used for the extraction of rock and gravel) and require monitoring of the site (Paulina Ranger District, Ochoco NF).

On the Forests and Grassland, most of the herbicide treatments are accomplished through agreements with Crook, Deschutes, and Jefferson counties and the Oregon Department of Agriculture. The Ochoco National Forest also has agreements with Wheeler and Grant Counties for weed inventory and treatment.

The following table displays the annual average acres treated during the time period 2000 to 2004 for herbicides on the Deschutes; 2003 to 2005 for herbicides on the Ochoco and CRNG; and 2003 to 2005 for manual treatments on the Ochoco.

Table 3. Average acres treated annually by method under existing NEPA documents.

	Deschutes NF	Ochoco NF	Crooked River NG	Total
Herbicide	82	85	108	275
Mechanical	0	0	0	0
Manual	555	663	47	1,265
Biocontrol	15	35	5	55
			Total	1,595

Other invasive plant control activities occur on the Forests: The Oregon Department of Transportation applies herbicides along the right-of-way of State Highway 26 that passes through National Forest System land and the Grassland. BPA and TransCanada (formerly PGT) have treated their facilities on special use permit areas in the past.

Biocontrol[4] agents that have been released consist of the Canada thistle gall fly (*Urophora cardui*) and the Canada thistle stem boring weevil (*Ceutorhynchus litura*). The analyses for effects of such tools have already been completed under documents developed by Agricultural Plant Health and Insect Service (APHIS) for approval of entry of such organisms. The completed EISes are available at: http://www.aphis.usda.gov/ppq/enviro_docs/index.html.

Under the No Action Alternative, the Forests would continue to implement prevention measures, and are required to comply with the standards for prevention practices included in the Invasive Plant ROD (USFS 2005b); the new treatment methods analyzed in the Invasive Plant FEIS would not be authorized for use in the project area. The Invasive Plant FEIS (USFS 2005a) predicts that the rate of spread of invasive plants would slow from implementing the prevention practices; however, prevention alone is insufficient to reach desired future conditions because of the extent of existing infestation. As a result, the infestations on the Forests and Grassland would continue to expand. Invasive plants not included in the earlier EAs would continue to expand; manual treatments cannot keep pace with the growth of the larger sites. No Forest Plan amendment is required to implement this alternative.

2.3.2 Alternative 2 – Proposed Action

Alternative 2 would treat 1,892 inventoried weed sites across the Forests and Grassland with integrated prescriptions that generally combine the use of herbicides with mechanical, manual, and cultural control methods. The Proposed Action utilizes new tools made available through the Invasive Plant FEIS and ROD (2005), new herbicides in particular. An early detection/rapid response strategy is included for newly discovered infestations of invasive plants.

Project Area Units

[4] Biological control is the deliberate use of natural enemies (parasites, predators, or pathogens) to reduce invasive plant densities. Insects released as biological controls generally feed on one portion of the plant; leaves, roots or seeds. Biological controls are therefore most effective when there is more than one insect control for each plant species.

Invasive plant treatments are proposed for 1,892 individually mapped weed sites. Mapped weed sites[5] cover approximately 14,547 acres and are aggregated into 289 project area units. The project area units incorporate from one to ten weed sites and are delineated to include the weed sites, uninfested or uninventoried space in between sites, and allow for expected spread (along road systems, for example). See Figure 1 and Maps 1-5. These project area units total approximately 52,015 acres.

Because invasive species are mobile and will spread, the project area units facilitate capture of resource concerns so that project design features can be applied if the existing weed sites are found to have spread or appear in a different part of the unit. Although each entire project area would be analyzed for effects, only the actual area containing invasive species would be treated in any given year.

The Project Area Unit is an important concept in this EIS because:

1. The Unit represents the local specialists' extrapolation of where the weeds may occur in uninventoried areas or where they are likely to spread in the near future, based on known sites.
2. Within the Project Area Unit the weeds may have already spread from the inventoried sites.
3. Effects analysis and project design features consider the resource conditions in the entire Unit, not just the area where an infestation has been mapped.

When weed sites are mapped, a boundary is drawn around an area of infestation, usually in the field with a hand-held Global Positioning Unit. The actual number, density, and distribution of the plants will vary. Some are patchy, some are dense, and some are single plants scattered widely in the site. Therefore, mapped weed sites incorporate more land than what is actually infested, and therefore more than what will actually be treated for invasive species. This is important because the estimate of effects in this EIS is based on the mapped weed site and thus can be considered the current maximum treatment scenario.

The treatments applied within each project area would be modified by Project Design Features (PDFs), which are intended to minimize or eliminate some of the potential adverse impacts (detailed in Section 2.4). PDFs define a set of conditions or requirements that an activity must meet to avoid or minimize potential effects on sensitive resources.

[5] The invasive plant inventory is one component of the Natural Resource Information System (NRIS) that the Forest Service uses to maintain natural resource data. Further information about the inventory can be obtained by visiting http://www.fs.fed.us/emc/nris/ftp/invasives/Terrav12_overview.pdf. The terms "weed" and "weed site" as used in this document refer to invasive plants and invasive plant sites; these terms are used interchangeably. The term "noxious weed" has a legal definition, see Glossary.

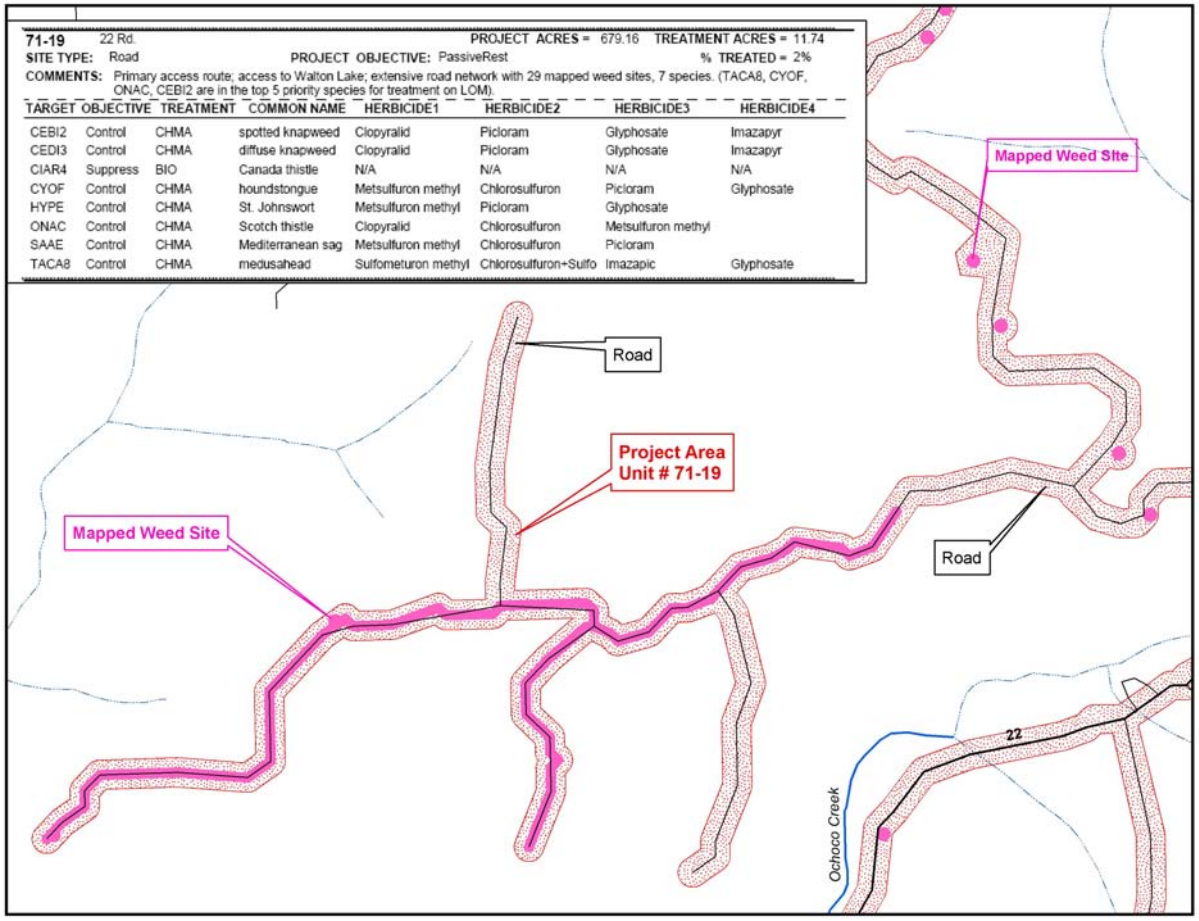

Figure 1. Representative Project Area Unit and Data from Project Area Summary Report, Appendix A of this EIS.

Table 4. Site Type Descriptions for Project Area Units.

Site Type	Project Area Unit Acres	% of Project Areas
Rec. Site, Admin. Site, Summer Home	70	**< 1 %**
Forest	8,850	**17 %**
Wildfire Area	1,296	**2.5 %**
Meadow, Wetland, Floodplain, Lakeside or Streamside	3,103	**6 %**
Other (e.g. quarry, utility)	890	**1.7 %**
Roadside	36,198	**70 %**
Road along stream	1,288	**2.4 %**
Trail	321	**< 1 %**
	52,015	

Site Types
Of the 289 project areas mapped, the majority are along roads. The following site types are a summary of more specific categories applied to each project area in the inventory database (See Appendix A).

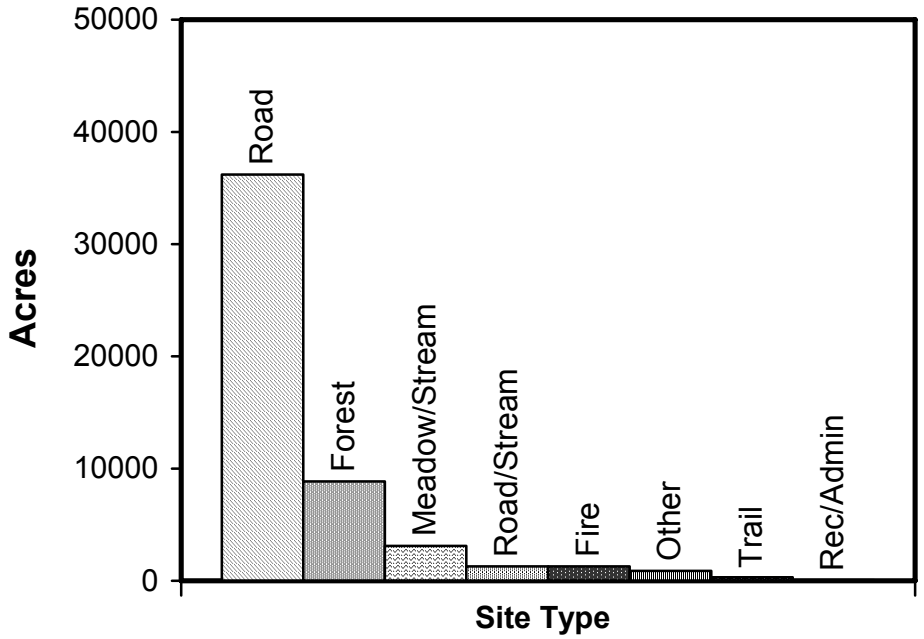

Figure 2. Acres of Project Area Units by Grouped Site Types. Disturbed areas, such as along roads, are the most common place to find invasive plants.

Treatments

Various factors are considered when determining the appropriate treatment(s) for invasive plant species. These factors include:

- Target invasive plant species and its biology (e.g. mode of reproduction)
- Aggressiveness of the species and how quickly it may spread
- Population size
- Site type (e.g. riparian, upland, disturbed roadside)
- Site accessibility
- Desired plant species to maintain on the site

Appendix A includes the "Project Area Table" which lists all project area units, the invasive species present, and proposed control measures for each species. Refer to project area Maps 1-5 for locations of the units. Larger-scale maps are available at the Deschutes or Ochoco National Forest headquarters offices in Bend and Prineville, or on the internet at http://www.fs.fed.us/r6/invasiveplant-eis/site-specific/DES/.

Each project area may contain several species of invasive plants and will therefore involve more than one treatment. Treatments are a combination of methods, such as chemical/manual or cultural/manual. The following table is intended to summarize the extensive amount of data in the Project Area Unit Table of Appendix A.

Table 5. Treatment methods applied within project area units, Alt. 2. This information summarizes the treatments that may be applied within project area units. This is a simplification of the prescription, as the order, timing, and application method will vary by site.

Treatment Method	Mapped Weed Site Acres	Project Area Unit Acres
Herbicide only	393	3,785
Herbicide plus one or more of the following: manual, biological, cultural, mechanical, fire	13,421	44,368
Manual only	706	3,635
Manual plus biological	0.5	19
Biological only	23	116
Cultural only	3	17

The most common prescription is chemical/manual (occurring within 154 Project Area Units), which means an initial application of herbicide would be followed up with either additional herbicide and/or manual treatments. If pre-implementation site visit shows that the invasive plant site is small and can be efficiently and effectively hand-pulled, then the treatment would revert to manual.

Table 6. Summary of Treatment Methods Combinations that will occur across Project Area Units, Sorted by Site Type, Alt. 2

Site Type	Treatment Method	Project Area Unit Acres
Rec. Site, Admin. Site, Summer Home	Herbicide, Manual	70
Forest	Biological Only	0.75
	Herbicide Only	346
	Herbicide plus one or more of the following: manual, cultural, biological, mechanical	8,028
	Manual Only	475
Wildfire Area	Biological Only	16
	Herbicide, Manual	1,280
Meadow, Wetland, Floodplain, Lakeside or Streamside	Biological Only	17.5
	Herbicide plus one or more of the following: manual, mechanical, cultural	3,004
	Manual only	81
Other (e.g. quarry, utility)	Herbicide Only	48
	Herbicide, Manual	842
Roadside	Biological Only	82

Site Type	Treatment Method	Project Area Unit Acres
	Herbicide Only	3,292
	Herbicide plus one or more of the following: manual, cultural, biological, mechanical	29,802
	Manual Only	2,930
	Manual plus biological	19
Road/Stream	Herbicide plus one or more of the following: manual, cultural, biological, mechanical, fire	1,288
Trail	Herbicide Only	100
	Herbicide plus manual	72
	Manual Only	149

The amount of treatment within a unit is based on the occurrence of mapped weed sites, which totals about 14,547 acres across the Forests and Grassland. The amount of weed sites in a unit can be considered the maximum amount of area that would be treated in a year; however, the actual amount would likely be less, and would be based on priorities and budget. See Chapter 3.1.2 for more discussion of likely treatment scenarios.

2.3.3 Alternative 3

Alternative 3 was developed to respond to issues surrounding the effects to aquatic organisms. The areas proposed for invasive plant treatments are the same as Alternative 2, but differ in the prescriptions.

Buffers along streams are based on general riparian reserve and riparian habitat conservation areas (see Table 7). A 300-foot buffer will apply to all perennial streams, all fish bearing streams and all perennial lakes, ponds, and reservoirs. Within the buffers, treatment methods are restricted as follows:

- The following chemicals would not be allowed within the aquatic buffers because of their risk to fish: Triclopyr, Picloram, or Sethoxydim.
- Broadcast spraying would not be allowed within these buffers or along road segments that are within 300 feet of perennial streams or lakes to reduce risk of drift into water.
- Machinery or equipment that could cause substantial sedimentation would not be allowed within the buffers or along roads where they are within 300 feet of a perennial stream or lake to limit risk of sedimentation.
- In addition, there would be no chemical herbicide application allowed within the definable channel of intermittent streams when they are dry or within 10 ft of perennial or fish bearing streams, rivers, lakes, ponds or reservoirs and intermittent streams when flowing. Ten feet is approximately three times the average spray width for spot spray applications. (Under Alternative 2, invasive species that are below the high water mark could be treated with herbicides as water levels drop seasonally). This will impact treatment on approximately 230 acres on perennial streams, springs, or lakes and approximately 30 acres on intermittent streams.

Table 7. Width of Aquatic Buffers applied in Alternative 3. Restrictions on Treatment Methods within these buffers are listed on previous page.

Classification	Aquatic Buffers for Alt. 3
Class 1	300
Class 2	300
Class 3	300
Class 4	Bankfull
Wetlands>1 acre	150
Wetlands<1 acre	150
Lakes	300
Ponds	300
Reservoirs	300
Springs	300

The following table displays how much of the National Forest System land falls within the buffers identified for Alternative 3 as well as how much of that is included in mapped invasive plant sites and project area units. A total of 8,671 acres of Project Area Units and 2,016 acres of mapped invasive plant sites are included in the aquatic buffers across the Forests and Grassland. These areas are subject to the restrictions listed on the previous page, and are therefore the areas where the two action alternatives differ.

Table 8. Project Area Units and Mapped Invasive Plant Sites within Alternative 3 Aquatic Buffers.

Subbasin (4th field)	Subbasin Name	Subbasin Acres	Acres of Project Area Units within Aquatic Buffer*	Acres of Infestation within Aquatic Buffer
17070201	Upper John Day River	1,370,836	458	17
17070204	Lower John Day River	2,020,149	453	64
17070301	Upper Deschutes River	1,378,957	3,080	1,091
17070302	Little Deschutes River	672,933	295	195
17070303	S. Fork Crooked River	980,618	943	280
17070304	Upper Crooked River	739,792	1,265	37
17070305	Lower Crooked River	1,204,246	1,454	98
17070306	Lower Deschutes River	1,468,564	424	223
17070307	Trout Creek	442,964	299	11
	Total	*10,279,059*	*8,671*	*2,016*

*See Table 7.

2.3.4 Elements Common to both Action Alternatives

There are 33 invasive plant species located across the project area. Some species have been inventoried across both Forests and the Grassland, such as spotted knapweed, while others are known only to one unit, such as ribbongrass. The following table shows the distribution of the known invasive species across the districts. Treatment will not be limited to these species.

Table 9. Invasive Plant Species inventoried and proposed for treatment on the Deschutes and Ochoco National Forests and Crooked River National Grassland. "X" indicates the location of inventoried site. *Acronyms are as follows*: BFR = Bend/Ft. Rock District; CRE = Crescent District; SIS = Sisters District; LOM = Lookout Mt. District; PAU = Paulina District. CRNG = Crooked River National Grassland.

Scientific Name	Common Name	Deschutes NF			Ochoco NF		CRNG
		BFR	CRE	SIS	LOM	PAU	
Acroptilon repens	Russian knapweed				X	X	X
Arctium minus	Lesser burdock				X		
Cardaria draba	Whitetop				X	X	X
Cardaria pubescens	Hairy whitetop		X				
Carduus nutans	Musk thistle				X		
Centaurea biebersteinii	Spotted knapweed	X	X	X	X	X	X
Centaurea debeauxii ssp. *thuillieri*	Meadow knapweed				X		
Centaurea diffusa	Diffuse knapweed	X	X	X	X	X	X
Centaurea solstitialis	Yellow star-thistle		X		X	X	
Cirsium arvense	Canada thistle	X	X	X	X	X	X
Cirsium vulgare	Bull thistle	X	X	X	X	X	X
Convolvulus arvensis	Field bindweed		X		X		X
Cynoglossum officinale	Houndstongue		X		X	X	
Cytisus scoparius	Scotch broom	X	X	X	X	X	
Dipsacus fullonum	Teasel				X	X	X
Elymus repens	Quackgrass	X					
Euphorbia esula	Leafy spurge	X	X		X	X	
Hypericum perforatum	St. Johnswort	X	X	X	X	X	X
Iris pseudacorus	Yellow flag iris			X			
Kochia scoparia	Kochia		X				X
Linaria dalmatica	Dalmatian toadflax	X	X	X	X	X	X
Linaria vulgaris	Butter and eggs		X		X		
Melilotus officianale	Yellow Sweet Clover		X				

Scientific Name	Common Name	Deschutes NF			Ochoco NF		CRNG
		BFR	CRE	SIS	LOM	PAU	
Onopordum acanthium	Scotch thistle	X	X		X	X	X
Phalaris arundinacea	Reed canarygrass	X	X	X			
Phalaris arundinacea var. picta	Ribbongrass			X			
Potentilla recta	Sulphur cinquefoil				X	X	
Rubus discolor	Himalayan blackberry					X	
Salvia aethiopis	Mediterranean sage	X			X	X	
Salsola kali	Russian thistle	X	X	X			
Senecio jacobaea	Tansy ragwort		X	X	X		
Silybum marianum	Blessed milkthistle				X		
Taeniatherum caput-medusae	Medusahead			X	X	X	X

Invasive Plant Treatment Methods Considered in this EIS

The following table lists the various treatment methods that have been approved for use in the Region. These methods are employed in the action alternatives. In many cases, these methods are most effective when used in combination with one another, as well as in combination with prevention activities in accordance with Integrated Weed Management principles. The location and size of the infestation, environmental factors, management objectives, and treatments costs all factor into the choice of treatment method(s).

Table 10. Invasive Plant Treatment Methods Approved for Use in the Region 6 Final Invasive Plant EIS and Considered in this EIS.

Type Treatment	Description	Comments
Manual	A non-mechanized approach, such as hand pulling and hand grubbing with tools such as a shovel or hoe to remove plants or cut off seed heads.	Depending on the species & size of infestation, manual treatments can be labor intensive and must be repeated several times throughout the growing season for at least several years (until the seedbank is exhausted). For some species, such as spotted knapweed, this may be the preferred method when populations are small and easily accessible.
Mechanical	The use of any mechanized approach to control or eliminate invasive plants. Includes mowing, weed whipping, road brushing, or root tilling methods to reduce plant cover and root vigor. Also can reduce biomass so less	Mechanical treatments are currently proposed for 3 species: reed canarygrass, Canada thistle, and St. Johnswort.

Type Treatment	Description	Comments
	herbicide is used.	
Biological	The release of insects or plant pathogens that are proven natural control agents of specific weed species. The insect or plant pathogen attack and weaken targeted weed species and reduce its competitive or reproductive capacity. Biological controls are used for reducing dense infestations of a weed species covering large areas.	This method also depends on the population distribution and type of site. In this project area, biocontrols are primarily used on knapweeds, Canada thistle, bull thistle, St. Johnswort, and toadflaxes. Redistribution of biological control agents would be expected to occur regardless of this decision (same as No Action alternative). Refer to Appendix B for more information.
Cultural	This category involves various methods (such as the use of grazing animals, addition of fertilizer/soil amendments, competitive planting, mulching, covering area with black plastic). For this project, the only cultural method being proposed is solarization, also called tarping. Will work best on small areas.	Covering infestations with black plastic may shade/kill rhizomes, but is not efficient for use on large areas.
Chemical (Herbicide)	Use of herbicides to kill plants and/or prevent seeds from germinating. Methods include spot spraying, wicking, boom broadcast, and stem injection. Spot spraying – targets individual plants and is usually applied with a backpack sprayer. Sometimes also applies using a hose off a truck-mounted or ATV-mounted tank. Wicking – involves wiping a sponge or cloth that is saturated with chemical over the plant. This is used in sensitive areas, such as near water, to avoid getting any chemical on the soil or in the water. Stem injection –technique currently used on Japanese knotweed in western OR & WA. Boom broadcast – involves using a hose and nozzle from a tank mounted on a truck or ATV. Herbicide is applied to cover an area of ground rather than individual plants. This method is used when the weed is dense	None of the alternatives propose aerial herbicide application. Regional Final Invasive Plant EIS Standards 15-23 apply to chemical treatments. Project Design Features further reduce potential impacts from herbicides. Broadcast application of herbicide would be considered for situations warranted by the density (70-80 percent cover) and/or the distribution of invasive plants (for instance, continuous along a road), unless limited by PDFs and/or buffers. Considering other restrictions, herbicide applications would be timed as best as practical to coincide with the best appropriate period of plant development to ensure maximum effectiveness, and herbicides would be applied at the lowest effective rate.

Type Treatment	Description	Comments
	enough that it is difficult to discern individual plants and the area to be treated makes spot spraying impractical.	
Prescribed Fire	Using fire to kill invasive plants, stimulate seed germination, or to remove dead plant material (thatch).	Extremely dense houndstongue patches on the Paulina Ranger District will be burnt to reduce cover and stimulate seed germination before spraying the area with herbicides.

The following table displays the biological control agents that will be used on Canada thistle and St. Johnswort sites in the planning area. These agents may already be present on the Forests or Grassland.

Appendix B, Table B-3 displays the biological control agents currently released across the planning area. Additional releases of these agents would be expected to occur regardless of this decision and in compliance with Standard 14.

Table 11. Biological Agents for Species Proposed for Biological Control.

Invasive Plant	Common Name Biocontrol Agent	Scientific Name Biocontrol Agent
Canada thistle (*Cirsium arvense*)	Canada thistle stem weevil	*Ceutorhynchus litura*
	Canada thistle stem gall fly	*Urophora cardui*
St. Johnswort (*Hypericum perforatum*)	St. Johnswort root borer	*Agrilus hyperici*
	St. Johnswort moth	*Aplocera plagiata*
	Klamath weed beetle	*Chrysolina hyperici*
	Klamath weed beetle	*Chrysolina quadrigemina*
	St. Johnswort gall midge	*Zeuxidiplosis giardi*

Herbicides

Table 12 displays the herbicide ingredients that may be used in both action alternatives as well as the lowest, typical, and highest application rates. The Project Design Features, Chapter 2.4 (PDFs) include some restrictions on the rate of chemical use. The R6 2005 FEIS, and Appendix D of this DEIS list the commercial herbicide names and risks inherent to using these herbicides. Risk assessments for these herbicides are available online at http://www.fs.fed.us/foresthealth/pesticide/risk.shtml and some herbicide labels are available at http://www.fs.fed.us/foresthealth/pesticide/labels.shtml. There is evidence that herbicides are the most effective treatment for many of the invasive plants that will be treated under this EIS. See Section 3.2 of Chapter 3 and Appendix D for more information on herbicides.

Table 12. Approved Herbicides Highest and Lowest Application Rates (from pesticide use reports), and Typical Application Rates.

Active Ingredient (a.i.)	Lowest Application Rate lb a.i./acre	Typical Application Rate lb a.i./acre	Highest Application Rate lb a.i./acre

Active Ingredient (a.i.)	Lowest Application Rate lb a.i./acre	Typical Application Rate lb a.i./acre	Highest Application Rate lb a.i./acre
Chlorsulfuron	0.0059	0.056	0.25
Clopyralid	0.1	0.35	0.5
Glyphosate	0.5	2	7
Imazapic	0.031	0.13	0.19
Imazapyr	0.03	0.45	1.25
Metsulfuron Methyl	0.013	0.03	0.15
Picloram	0.1	0.35	1.0
Sethoxydim	0.094	0.3	0.38
Sulfometuron Methyl	0.03	0.045	0.38
Triclopyr	0.1	1.0	10
Nonylphenol Polyethoxylate Surfactant (NPE)	0.167	1.67	6.68

A goal of the Forests is to minimize the use of picloram across the planning area because of its persistency. Therefore, picloram will only be applied if there is no other effective herbicide available for the target species.

Project Area Units listed in Appendix A may have more than one effective herbicide listed. The herbicides used would depend on the invasive plants present, the biology and ecology of particular species, site location, proximity to water, and size of infestations. These herbicides have restrictions based on known impacts and risks. These restrictions are detailed in Section 2.4 Project Design Features.

Effective Treatment Methods by Target Species

The treatment methods described in the previous table can be applied effectively to certain target species. Appendix B provides current information on the methods that are effective in treating target species in the project area. No single management technique is perfect for all weed control situations; the Forest Service follows the integrated weed management approach to achieve effective and practical treatment at each site.

Site Priority and Objectives

Invasive plant sites are prioritized for treatment based on the level of risk associated with the species and the type of site. Though all invasive plant sites are important to treat, the sheer number and distribution of sites results in the need to prioritize and focus our treatments. Prioritization will be a step in the annual implementation planning process (see page 39 and Appendix F), and is not included as a NEPA decision.

High priority sites include areas that have the potential to more rapidly spread seeds and propagules of invasive plant species, such as quarries, roads, and high use recreation sites, as well as current treatment sites. High priority sites are also determined by high priority species that have potential to spread quickly and change plant species composition to the extent that resources, such as sensitive plant populations, wildlife and livestock forage are at risk.

Medium priority sites include larger infestations with the goal to control or contain these sites to prevent further introduction and spread and environmental degradation. Some sites may be controlled

over time given enough years of treatment. Other sites are so large and widespread that a more reasonable goal is to contain these sites by focusing treatment on the outside boundaries of the infestation to prevent further spread. Medium priority sites can contain high priority species, such as the knapweeds and houndstongue.

Low priority sites are either those infestations that are extremely difficult to eradicate or control, such as large, well-established infestations of reed canarygrass along lakeshore edges, or are low priority because the invasive plant species is less aggressive and there is less potential for significant ecological impacts (e.g., bull thistle).

Table 13. Treatment prioritization strategy used annually to implement invasive plant treatments on the Deschutes and Ochoco National Forests and Crooked River National Grassland.

Priority	Description
High	Eradication, control or containment of aggressive new species with potential for significant ecological impact. New infestations in high priority areas not yet infested. Infested active gravel, fill, sand stockpiles, quarry, and barrow material sites. Active restoration sites where invasive plant control is essential for successful restoration. Sites that threaten or jeopardize Threatened, Endangered, and Sensitive plant and animal habitat. Sites we have already been treating and need to continue this commitment. Areas of high traffic (e.g., roads, high use recreation sites, trailheads, horse camps, fire camps, parking lots, etc.). Unique plant habitats (e.g., wetlands, fens, bogs, botanical areas, Research Natural Areas).
Medium	Containment of existing large infestations of priority species with focus on boundaries of infestation. This is to prevent the spread of the invasive plant beyond the perimeter of patches or infestation areas mapped from current inventories. Control of existing large infestations with a high potential for significant reduction and at least 15% of native plant component. Focus first on: 1) sites with the highest native plant cover available to colonize the site as the invasive plants are reduced; and 2) outside edges of population to prevent/contain further spread Road systems that have less traffic but still function as seed dispersal vectors.
Low	Suppression of existing large infestations when eradication/control or containment is not possible. Tolerate. Accept the continued presence of established infestations and the probable spread to ecological limits for certain species. Try to exclude new infestations through prevention practices.

Target species within each project area unit are assigned a treatment strategy. These strategies vary depending on the potential negative impacts of a given invasive species and the value or sensitivity of the treatment site (or adjacent lands) (USFS 2005a, page 3-78). The Invasive Species section of Chapter 3 and Appendix A provide further information on the site-specific conditions within the project area units.

The following objectives are identified for the approximately 1,892 known invasive plant sites on the Forests and Grassland:

- **Eradication:** Attempt to totally eliminate an invasive plant species from a USDA Forest Service unit, recognizing that this may not actually be achieved in the short term since re-establishment/re-invasion may take place initially.
- **Control:** Reduce the infestation over time; some level of infestation may be acceptable.
- **Suppression:** Prevent seed production throughout the target patch and reduce the area coverage. Prevent the invasive species from dominating the vegetation of the area; low levels may be acceptable.

- **Containment:** Prevent the spread of the weed beyond the perimeter of patches or infestation areas mapped from current inventories.
- **Tolerate:** Accept the continued presence of established infestations and the probable spread to ecological limits for certain species. Try to exclude new infestations through prevention practices. This is for species where other levels of effort have not been successful.

Site Restoration/Revegetation

Revegetation with carefully selected plant materials is a critical component of integrated weed management strategies. Commonly used control tactics, such as manual or chemical treatments, may eliminate or suppress invasive species in the short term, but the resulting gaps in vegetation and bare soil create open niches that are susceptible to further invasion by the same or other undesirable plant species (Erickson et al. 2003).

Determining the need for active restoration/revegetation versus passive restoration (allowing plants on site to fill in a treated area) is the first step when addressing this need (USFS 2005a). Passive restoration depends on re-colonization from the existing seedbank and from plant propagules dispersed from surrounding sources, as well as native species from within the invasive plant site. Passive restoration may be appropriate where treated sites leave relatively little bare ground or along less-disturbed roadsides where adjacent native vegetation can provide adequate seed source to recolonize treated areas. Passive restoration will also occur on sites proposed for treatment with selective herbicides. For example, use of clopyralid on spotted knapweed within bitterbrush habitats would selectively treat the knapweed and would not harm the bitterbrush.

In some situations, native plant seeds in the soil seedbank can establish following invasive plant treatments on highly disturbed sites. After three years of treating spotted knapweed with a broadleaf selective herbicide on Highway 97 (high use transportation route), monitoring demonstrated the areas became dominated by sheep fescue (*Festuca ovina* var. *rydbergii*). We hypothesize that the seeds existed in the soil and were able to germinate with reduced competition from spotted knapweed.

Active revegetation is a long-term commitment that may best be focused on highest priority areas that are either ecologically unique, or to provide competition for highly aggressive invasive plant species. Active restoration is much like gardening – it requires long-term annual maintenance to control invasive plants in order to ensure successful revegetation. A three-year revegetation study of invasive plant sites on the Deschutes National Forest found that germination and establishment of native seeds was very slow and the small seedlings are slow-growing (Hurd 2005). This project found that native seeding in arid environments will require much more than three years of funding and time to monitor in order to see results. See Appendix E for more on revegetation planning.

Each Project Area Unit was evaluated for whether to allow for passive restoration from adjacent native plant communities or take an active role in revegetating the treated area. Many of our invasive plant sites are within or adjacent to native plant communities that will provide seeds and propagules to recolonize the invasive plant site following treatments. Nine Project Area Units have been selected for active revegetation (See Page 45 of Appendix A). Some areas were selected for their ecological importance and to out-compete aggressive invasive plant species (e.g., ribbongrass sites along the Metolius River and reed canarygrass sites in Big Marsh and Trout Creek Swamp); other areas were selected because revegetation is a critical step in rehabilitating degraded sites where the native plant component is lost and the invasive plant species is highly aggressive (e.g., medusahead and houndstongue sites on Paulina District).

In some cases, active restoration is not the preferred choice due to the nature of the site. Examples include continually disturbed areas, such as road shoulders that are frequently maintained, active gravel pits, and river banks that are prone to annual scouring; or areas that are not naturally vegetated, such as mid-channel gravel bars.

Revegetation will involve site preparation, such as raking to prepare a seed bed to promote seed germination, planting of seeds and/or propagules (depending on the species, this is done either in early spring or late fall to take advantage of available moisture), vigilant treatment of invasive plants as they germinate from the existing seedbank, and monitoring the results. In some cases, a follow-up seeding/planting may need to be done.

Early Detection-Rapid Response Strategy

The Early Detection/Rapid Response (EDRR) strategy coupled with prevention guidelines and an annually-updated inventory, will allow us to maintain our invasive plant-free areas in an invasive plant-free condition. Under the EDRR approach, new or previously undiscovered infestations would be treated using the range of methods described in this EIS, and according to the Project Design Features listed later in this Chapter. The nature of invasive plant species makes this a necessary component of the Forests' treatment program:

- The precise location of individual target plants, including those mapped in the current inventory, is subject to rapid and/or unpredictable change;
- The NEPA process does not allow for rapid response; infestations may grow during the time it takes to prepare NEPA documentation.

The intent of the EDRR approach is to treat new infestations when they are small so that the likelihood of adverse effects from treatment is minimized, *and* the invasives plants will do less ecological damage. We are assuming that new infestations will be similar to current infestations. For instance, the majority of weed sites occur along roads and that will probably be the case into the near future. We also expect that the impacts of similar treatments would be predictable. The precise location or timing of the treatment may be unpredictable; however, project design features – intended to minimize or eliminate adverse effects that could occur – keep effects within those disclosed for the current inventory.

The EDRR approach allows the Forest Service to treat anywhere on the Forest that the need exists, based on, but not limited to, the current inventory and anticipated rates of spread. The Implementation Planning process detailed below is intended to ensure that effects are within the scope of those disclosed in this EIS; new situations that may have different effects would be subject to further NEPA analysis. This strategy would follow the design of the alternative chosen.

The following steps went into developing the EDRR approach:

1. The invasive plant inventory for the Deschutes and Ochoco NF and Crooked River National Grassland was updated. Infested sites were aggregated into Project Area Units (Units) and entered into a database.
2. The Interdisciplinary Team considered the site conditions within the units and analyzed the potential effects of the preferred treatment methods for the areas.
3. Project Design Features were developed to minimize or eliminate adverse effects for situations where there was potential, resulting in low risk to people or the environment.
4. The **Implementation Planning** process is the means by which the selected alternative is properly implemented and serves as the framework for the EDRR approach. As treatments are applied to currently undetected invasive plants, project design features would be applied (to situations/conditions similar to those analyzed in the EIS) to eliminate or minimize adverse effects. Uncertainty is addressed through monitoring and adaptive management.

Implementation Planning

This section outlines the process that would be used to ensure that the selected alternative is properly implemented. This process integrates the strategies outlined in this EIS and also satisfies pesticide use planning requirements in the Forest Service Handbook (FSH 2109.14). An invasive plant assessment review team will be assembled to review the annual program, select appropriate PDFs, seek line officer approval, and implement required public notification. Appendix F goes in to more detail on the process outlined here:

1. Characterize invasive plant infestations to be treated. This step incorporates information from surveys and monitoring to update the invasive plant database, identify site conditions, and ensuring that no extraordinary conditions exit.

2. Develop site-specific prescription and plans. The second step involves identifying a preferred method of treatment and determining if these methods are within the scope of the analysis in this EIS. Project Design Features are applied and consistency with Forest Plan standards is determined.

3. Coordination and Notification. Appropriate notification ensures that the adjacent landowners, partners, the general public, regulatory agencies and Tribes is aware of proposed invasive plant treatments.

4. Accomplishment and Compliance Monitoring. A monitoring framework is provided by the R6 2005 ROD, to help Forests determine if actions are taking place as described in the EIS, and if progress towards the desired future condition is occurring.

5. Treatment and Post-Treatment Monitoring and Adaptive Management. Effectiveness of treatment and effectiveness of project design features will be monitored. A protocol for monitoring effectiveness of measures intended to protect federally listed species is being developed by the Forest Service, Pacific Northwest Region.

Forest Plan Amendments

The invasives treatment project is utilizing new tools made available to the Region with the R6 2005 ROD. In particular, the proposed action involves the use of several chemical herbicides.
Two standards and guidelines in the Ochoco National Forest and Crooked River National Grassland Land and Resource Management Plan (Forest Plan) discourage the use of chemical treatments. The Forest Service proposes rewording both of these standards to allow, where appropriate, careful and targeted herbicide use to treat invasive plants as part of an integrated weed management program. This change will reconcile our Forest Plan with the new direction provided in the *Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision* (USFS 2005b).

Table 14. Proposed Amendment, Ochoco National Forest Land and Resource Management Plan.

Forest Plan	Scope	Current Standard and Guideline	Proposed Change
From Och/CRNG 1995 Weed EA/DN	Forest-wide Direction	Use chemical treatments only when other methods have proven ineffective or impractical. Adhere to EPA regulations and herbicide label restrictions.	Use herbicides to treat invasive plants according to the standards in the Pacific Northwest Region: Preventing and Managing Invasive Plants Record of Decision (2005).
From Och/CRNG 1995 Weed EA/DN	Grassland -wide Direction	Use chemical treatments only when other methods would be ineffective or impractical.	

2.4 Project Design Features Common to all Action Alternatives

Project design features (PDFs) were developed to reduce some of the potential impacts the various treatments may cause. PDFs define a set of conditions or requirements that an activity must meet to avoid or minimize potential effects on sensitive resources. For PDFs involving herbicides, these are an added layer of caution to the already-regulated and approved use of these chemicals. All PDFs are required for both Action Alternatives. PDFs are not optional and are incorporated in the effects analysis.

These PDFs are based on site-specific resource conditions within the Project Area Units, including (but not limited to) the current invasive plant inventory, the presence of sensitive species and their habitats, proximity to water and potential for herbicide delivery to water, and the social environment.

For emphasis, some design features include herbicide label guidance and Forest Plan standards. Not all Forest Plan standards or label directions are repeated here; however, they will be followed.

Concern	Project Design Feature	Source/Comments
Pre-Project Planning		
1.	The nature of invasive plant management requires ongoing project review and evaluation. The location of invasive plants in relation to various environmental components (i.e. plant species of local interest, special forest product gathering areas) is likely to change over the life of the project, thus animal species/habitats of concern, watershed and aquatic resources of concern (sensitive soils, streams, lakes, wetlands, high risk roadsides, municipal watersheds, domestic water sources), places where people gather, and range allotment conditions would be confirmed prior to treatment and appropriate design features would be applied. Apply PDFs (including Terms and Conditions from consultation with regulatory agencies) depending on site conditions.	This process based on similar projects nationwide. Implementation Planning discussed in Appendix F.
To Prevent Spread of Invasives from Treatment Activities or Re-Introduction on a Treated Site		
2.	Vehicles and equipment (including personal protective clothing) used for invasive plant treatment activities would be cleaned prior to entering National Forest land.	Standard #2 2005 R6 ROD
3.	Where practical, thoroughly clean and inspect all equipment and clothing before moving off treatment areas.	This is a common measure used to prevent spread.
4.	All invasive plants that are manually excavated after flower bud stage will be bagged and properly disposed of at an approved facility (e.g. landfill).	This is a common measure used to prevent spread.
5.	When applying herbicides, protect non-target vegetation whenever practical in order to minimize the creation of exposed ground and the potential for re-infestation.	To reduce further invasive plant infestation at the treated site
Coordination with other Landowners, Agencies		
6.	The Forest Service would work with owners and managers of neighboring lands to respond to invasive plants that infest multiple ownerships. Treatments within 100 feet of Forest boundaries, including lands over which	To increase effectiveness of treatments on multiple ownerships and ensure neighbors are fully informed of

	the Forest has right-of-way easements, would be coordinated with adjacent landowners	nearby herbicide use.
7.	Herbicide use within 1000 feet (slope distance) of known domestic surface water intakes would be coordinated with known water user or manager.	1000 feet selected to respond to public concern. Herbicide use as proposed will not contaminate drinking water supplies.
8.	Municipal watershed agreements would be followed. Coordination with water boards and users would occur as required and herbicide use or application method may be excluded or limited in some areas.	See existing municipal agreements.
To Ensure Effective, Safe, and Proper use of Herbicides and to Limit Potential Adverse Effects on People and the Environment		
Field Operations / Worker Safety		
9.	Herbicides would be used in accordance with label instructions, except where more restrictive measures are required as described below. Herbicide applications will only treat the minimum area necessary to meet site objectives. Herbicide formulations would be limited to those containing one or more of the following 10 active ingredients: chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr. Herbicide application methods include wicking, wiping, injection, spot, and broadcast, as permitted by the product label and these Project Design Features. The use of triclopyr is limited to spot and hand/selective methods. Herbicide carriers (solvents) are limited to water and/or specifically-labeled vegetable oil.	Standard #16 2005 R6 ROD; Pesticide Use Handbook 2109.14 Limits potential for adverse effects on people and the environment.
10.	Herbicide use would comply with standards in the *Pacific Northwest Regional Invasive Plant Program – Preventing and Managing Invasive Plants* ROD (2005), including standards on herbicide selection, restrictions on broadcast use of some herbicides, tank mixing, licensed applicators, and use of adjuvants, surfactants and other additives.	2005 R6 ROD Limits potential adverse effects on people and the environment.
11.	Workers will use appropriate personal protective clothing and equipment at all times during application. Traffic control and signing during invasive plant-treatment operations will be used as necessary to ensure safety of workers and the public.	Label and MSDS requirements. Reduces potential for workers to be exposed.
12.	Lowest effective label rates would be used. **Spot** herbicide applications would not exceed application rates for the following herbicides: • Imazapyr would not exceed 0.70 lb of active ingredient per acre (ai/ac). • Sulfometuron methyl would not exceed 0.2 lb ai/ac. **Broadcast** application would not exceed application rates for the following herbicides: • Picloram at any rate higher than 0.5 lb. a.i./acre. • Sulfometuron methyl at any rate higher than 0.12 lb a.i. /acre. • NPE surfactant at any rate greater than 0.5 lb a.i./acre.	These application rates are below thresholds of concern for workers, the public, fish, and other aquatic organisms. See Table 2.10 for low, typical, and highest rates.
13.	Use selective spray techniques, or other targeted application techniques (cut stump, basal spray, etc.).	To further reduce the amount of herbicide applied per acre.
14.	Favor Garlon 3A over Garlon 4 wherever equally or more effective.	Garlon 3A has less concern for human health

15.	Herbicide applications would occur when wind velocity is between two and eight miles per hour. The less than 2 mph standard is to avoid spraying during inversions. During application, weather conditions would be monitored periodically by trained personnel.	Typical measure to reduce drift.
16.	Use low nozzle pressure, apply as a coarse spray, and use nozzles designed for herbicide application that do not produce a fine droplet spray, e.g., use a nozzle diameter to produce a median droplet diameter of 200-800 microns, with an objective of >500 microns.	Label advisory. These are typical measures to reduce drift.
17.	No spraying would occur if precipitation is occurring or is predicted to occur within 24 hours within the given treatment area. Local conditions to be monitored by the licensed applicators.	Label instruction. Reduces potential for runoff and ensures effective treatment of target vegetation.
18.	Choose transportation routes with fewer stream crossings, less traffic, and fewer blind curves. Use a guide vehicle when more than one vehicle is traveling to the site, or when large quantities or other circumstances dictate.	To reduce likelihood of spills.
19.	A spill cleanup kit would be available whenever herbicides are transported or stored.	To contain any accidental spills. Source: FSH 2109.
20.	The applicator is responsible for the immediate cleanup of all spills. An Herbicide Transportation and Handling Safety/Spill Response Plan would be the responsibility of the herbicide applicator. *At a minimum the plan would:* ▪ Address spill prevention and containment. ▪ Estimate and limit the daily quantity of herbicides to be transported to treatment sites. ▪ Require that impervious material be placed beneath mixing areas in such a manner as to contain small spills associated with mixing/refilling. ▪ Require a spill cleanup kit be readily available for herbicide transportation, storage and application (minimum FOSS Spill Tote Universal or equivalent). ▪ Outline reporting procedures, including reporting spills to the appropriate regulatory agency. ▪ Ensure applicators are trained in safe handling and transportation procedures and spill cleanup. ▪ Require that equipment used in herbicide storage, transportation and handling are maintained in a leak proof condition. ▪ Address transportation routes so that traffic, domestic water sources, and blind curves are avoided to the extent possible ▪ Specify conditions under which guide vehicles would be required. ▪ Specify mixing and loading locations away from water bodies so that accidental spills do not contaminate surface waters. ▪ Require that spray tanks be mixed or washed further than 300 feet of surface water. ▪ Ensure safe disposal of herbicide containers.	Source: FSH 2109.14 Reduce likelihood of spills and to contain any spills. Reduce potential for adverse effects from accidental spills.
21.	Estimate and limit the daily quantity of herbicides to be transported to treatment sites.	To reduce potential for spills.
22.	Spray equipment would be calibrated prior to seasonal start-up and periodically throughout the season to assure accuracy in applications.	To ensure proper application of herbicide.
23.	Minimize traffic in riparian reserves/RHCAs where appropriate.	To minimize impact to riparian areas.

24.	Exact fueling sites will be identified prior to implementation of the project, and would be at least 150 feet from lakes, wetlands, or stream channels.	To minimize risk of fuel entering water.
25.	Some sites may only be reached by water or by crossing streams on foot. The following measures would be used to prevent a spill during water transport. • Herbicide would be carried in 1 gallon or smaller plastic containers. The containers would be wrapped in plastic bags and then sealed in a dry-bag. The dry bag would be secured to the watercraft. • Personnel applying herbicide by hand or with a backpack sprayer, or personnel manually pulling or grubbing invasive plants, would avoid, to the extent possible, standing or walking in wetted streams or other water bodies.	To reduce potential for spill in water.
Public Health / Public Notification		
26.	The public would be notified about upcoming herbicide treatments via the local newspaper, Forest Service website, fliers, individual notification, or posting signs.	Standard #23, R6 2005 ROD. To ensure no inadvertent public contact with herbicides.
Public Health / Municipal Watersheds		
27.	Broadcast application of herbicides will not occur in municipal watersheds without the consent of the water agency/association. Herbicide application will be to individual plants by spot spraying, stem injection, or dabbing. Invasive species treatments other than manual (hand pulling) and biological (insects) will be coordinated with the municipal department in charge of the water system.	To ensure neighbors are informed; meet requirements of existing municipal agreements.
28.	Herbicides will not be applied within 100 feet of the municipal water intake or within 100 feet of the stream for the first 600 feet above the intake.	To respond to public concern. Herbicide use as proposed for this project would not contaminate drinking water supplies.
Public Health / Other Drinking Water Sources		
29.	No herbicide be applied within 100 feet of a domestic well or spring box. No broadcast application of herbicides will occur within 200 feet of a domestic well or spring box.	To respond to public concern. Herbicide use as proposed for this project would not contaminate drinking water supplies.
30.	The special use permit holder or agency department of record (e.g. recreation or facilities) responsible for the well or spring box will be notified prior to application of herbicides and will mark the diversion point so it can be avoided by the applicator and permittee can modify their use if so desired.	To ensure users are informed.
Public Health / Recreation or other High Use Sites		
31.	High use areas, including administrative sites, developed campgrounds, visitor centers, and trailheads would be posted in advance of herbicide application or closed. Areas of potential conflict would be prominently marked on the ground or otherwise posted. Postings would indicate the date of treatments, the herbicide used, and when the areas may be reentered.	Reduces conflicts and ensures no inadvertent public contact with herbicides.
32.	When possible and treatment will still be effective, timing of treatments within high use recreation sites will avoid the normal high use period between June 15 and September 15, (peak use is in July and August).	To reduce conflicts with forest users.
33.	For herbicide use within 100 feet of high-use recreation sites, selective application methods at typical or lower rates of application will be used.	To reduce drift in areas of high use.
34.	Gathering areas, campgrounds, and administrative sites may be closed during	To reduce conflicts with forest

	and immediately after triclopyr application to eliminate accidental exposures. Extent of closure would be dependent on nature of herbicide used.	users.
35.	Minimize trampling and soil disturbance and visual impacts by limiting the number of people, machineries, the number of entries, and by using light-weight machinery within 100 feet of recreation sites.	To reduce impacts to recreation areas.
Public Health / Special Forest Products Including Cultural Use Plants		
36.	Do not apply NPE surfactant at any rate greater than 0.5 lb a.i./acre in known areas of wild food collection. Favor other classes of surfactants wherever they are expected to be effective.	To protect public/worker health. Rate is below thresholds of concern for workers, the public, fish, and other aquatic organisms.
37.	In areas of known special forest product or other wild foods collection application of triclopyr will be limited to direct application to target vegetation only; do not exceed FS typical rate (1.0 a.i./acre); Favor Garlon 3A over Garlon 4 wherever it is expected to be effective.	To eliminate scenarios where people could be exposed to harmful doses of triclopyr.
38.	Popular berry and mushroom picking areas would be posted or otherwise marked where treatment with herbicides is occurring.	From Appendix Q of R6 2005 FEIS. Eliminates any scenario where people may be exposed to herbicide.
39.	Special forest product gathering areas may be closed for a period of time to minimize inadvertent public contact with herbicide occurs.	To eliminate scenarios where people could be exposed.
40.	Special forest product gatherers would be notified about current herbicide treatment areas when applying for their permits. Such information would be provided in multi-lingual formats depending on the known clientele for the forest.	To ensure no inadvertent public contact with herbicide.
41.	Avoid using herbicides where cultural use plants are present during their season of collection, where possible (mostly spring and early summer for root plants and late summer to fall for berries). Fiber and medicinal plants may have different harvest seasons. This measure applies to known collecting areas. Annually consult with American Indian tribes so members can be notified prior to gathering cultural plants. When plants are identified by tribes, buffer as for botanical special status species.	To ensure no inadvertent public contact with herbicide occurs and so that cultural use plants are fully protected.
To Protect Soils, Water Quality, Fisheries and Aquatic Organisms		
42.	Oregon Department of Fish and Wildlife (ODFW) Guidelines for Timing of In-Water Work Periods would be followed for portions of the project that fall below the ordinary high water mark. Applies to all treatment methods.	To reduce potential for causing negative impacts to fish and fish habitat.
43.	Use only aquatic formulations or low aquatic risk herbicides on soils with seasonally high water tables, where label restrictions allow. Land types in treatment areas identified as having a high water table during parts of or all of the year would be field-checked; treatment methods would be modified based on ground conditions.	Source: SERA Risk Assessments; R6 2005 FEIS and Fisheries Biological Assessment. To ensure herbicide is not delivered to streams in concentrations that exceed levels of concern.
44.	POEA and NPE surfactants would not be used in applications within 100 feet of surface water, wetlands or along roads with ditches that feed into streams.	Protects aquatic organisms.
45.	Do not use clopyralid or metsulfuron methyl on high porosity soils (texture class 3 or 4) where there is a potential for contamination of surface or groundwater (such as where water table is high).	Label advisory. To reduce potential for contamination of surface or groundwater.

46.	No more than one application of picloram or sulfometuron methyl would occur on a given area in a calendar year, except to treat areas missed during the initial application.	To reduce potential for accumulation in soil.
47.	Do not use chlorsulfuron on soils with high clay content (texture class 1).	Label advisory. To avoid excessive herbicide runoff.
48.	Do not use picloram and/or sulfometuron methyl on soils with a high clay content (texture class 1); shallow and unproductive soils; or acidic soils unless other methods are not available or feasible.	Label advisory. To avoid excessive herbicide runoff; reduce potential for entering surface and/or ground water, or to accumulate in soil.
49.	Garlon 4 (terrestrial formulation of triclopyr) is not allowed within 150 feet of any water body or stream channel. Outside of the 150 foot distance, Garlon 3a is preferred over Garlon 4 where it is effective.	To protect aquatic organisms. Lower risk herbicides are preferred where effective; protections of terrestrial wildlife and human health.
50.	Apply erosion control measures and native revegetation (*e.g.*, mulching, native grass seeding, planting) where detrimental soil disturbance or de-vegetation may result in the delivery of measurable levels of sediment to federally listed fish species' critical habitat.	Minimize sedimentation.
51.	Implement Mixture Analysis identified in Regional Fisheries Biological Assessment for tank mixtures proposed. The sum of Hazard Quotients (HQ) for tank mixtures shall not exceed 1.	R6 2005 ROD and Fisheries Biological Assessment
52.	All chemical storage, chemical mixing, refilling and post-application equipment cleaning is completed at least 300 feet from live water and in such a manner as to prevent the potential contamination of any riparian area, perennial or intermittent waterway, ephemeral waterway, or wetland.	To prevent water contamination.
53.	Limit the number of people and the number of entries in areas within 100 feet of streams.	To minimize trampling in riparian areas and fish habitat.
Alternative 2 Only		
54.	Use selected buffers and application methods from Table 15 below for application of chemicals. Buffers can be increased on a site specific basis if analysis determines that characteristics such as soils, slope, groundwater depth, etc indicate high potential for the contamination of groundwater or surface waters. A Forest Service fisheries biologist will be consulted during project implementation planning to identify any steps necessary for identifying the areas during application.	Based on label advisories, SERA risk assessments. Demonstrate compliance with Standards #19 and 20. To reduce likelihood that herbicides will enter surface waters in concentrations of concern.
Alternative 3 Only		
55.	Use selected buffers and application methods from Table 16 for application of chemicals. Buffers can be increased on a site specific basis if analysis determines that characteristics such as soils, slope, groundwater depth, etc indicate high potential for the contamination of groundwater or surface waters. A Forest Service fisheries biologist will be consulted during project implementation planning to identify any steps necessary for identifying the areas during application.	Based on label advisories, SERA risk assessments. Demonstrate compliance with Standards #19 and 20. To reduce likelihood that herbicides will enter surface waters in concentrations of concern.
56.	Picloram, Triclopyr, Glyphosate, Sethoxydim and chemicals with NPE or POEA surfactants will not be applied within 300 ft of streams, lakes, and wetlands. Aquatic approved Glyphosate and aquatic approved Triclopyr will be allowed in RR/RHCA areas.	Alt. 3 allows lower risk herbicides near water.
57.	No application of any chemicals within the high water mark of intermittent streams, lakes, ponds, wetlands, or reservoirs. The high water mark is	Further protection of aquatic organisms by reducing

	defined as bankfull or an area above the water surface where non aquatic vegetation is established.	potential for contamination in water.
58.	No broadcast spraying within 300 feet of all perennial water sources or on road segments within 300 feet of perennial waterbodies.	This will minimize/eliminate any potential for chemical drift or runoff entering water sources. Source of 300 ft: NWFP
59.	No application of any chemicals within 10 feet of the water's edge of perennial sreams, rivers, lakes, ponds, wetlands, or reservoirs.	Further protection of aquatic organisms by reducing potential for contamination in water.
60.	No mechanical treatment within 300 feet of all water sources or on road segments that are within 300 feet of perennial waterbodies.	This will minimize/eliminate potential for additional fine sediments to enter waterbodies through soil disturbance and bare soil exposure. Source of 300 feet: NWFP
To Ensure the Protection of Threatened, Endangered, Sensitive (TES) or Survey and Manage (S/M) Plant Species		
61.	Surveys will be conducted for Threatened, Endangered, and Sensitive Plants and Survey & Manage Plants prior to invasive plant treatments **if**: 1) the area has not already been surveyed for these species; **and** 2) if the area contains likely habitat for any of these species; **and** 3) if the proposed treatments are likely to have a negative impact to individual plants. Surveys will be conducted in the area within 100 ft. from where broadcast application of herbicides is planned and within 10 ft. for all other treatment types (herbicide spot spray, manual, etc.). If species of concern are located, then project design feature 62 will be applied.	Forest Service Manual 2670; Current Survey and Manage Species Direction. To ensure sensitive species are protected and surveys are conducted when appropriate.
62.	Within TES and S/M plant populations, prior to herbicide treatments where there are potential effects from the herbicide, a USDA Forest Service Botanist will identify the steps that need to be taken to protect the TES plants. This may involve avoiding TES and S/M plant populations or individuals (i.e., identify/map areas around sensitive plant populations that must be avoided, or flagging individual TES and S/M plants), and/or altering treatments (e.g., switching from herbicide to manual treatments within and adjacent to a TES plant population). USDA Forest Service Botanists will work closely with herbicide applicators to ensure project design features are implemented, will monitor and document the results, and use adaptive management to refine treatments as needed to adequately protect TES and S/M plant species.	To ensure appropriate steps are taken during implementation to protect sensitive or survey and manage plants.
63.	For manual treatments within TES plant populations, a USDA Forest Service Botanist will instruct workers in the proper identification of plant species to be avoided and will monitor the manual treatments to ensure that individual TES plants are protected.	To ensure protection of TES and S/M plants.
64.	If USDA Forest Service Botanists determine that buffers are needed to protect TES and Survey & Manage plant species from herbicide spraying, the buffer widths in PDF 65 will be employed. Treatments would be stipulated as for the given width. Determination of the need for buffers depends on the species to be protected, the invasive plant species to be treated, and the type of treatment that would be used. For example, if a selective herbicide is used, such as clopyralid (which only targets specific plant families), buffers may not be needed for sensitive plant protection.	To ensure protection of TES and S/M plants.

65.	**Protection Buffer Widths for TES and S&M Plant Species.** *Greater than 100 feet:* All treatments permitted. All herbicides are permitted. *100 to 10 feet:* All treatments, except broadcast spraying permitted. For herbicide treatment, use protective measures such as low-pressure spot-spray, directed spray applications, backpack applications, and/or protective barrier to prevent herbicide residues from impacting these species. *Less than 10 feet:* No broadcast spraying permitted. Spot treatment (hand application of herbicides) is permitted. Precautions must be taken to avoid contact with individual TES/S&M plant species. Manual treatments permitted (apply PDF 64).	Broadcast buffers based on Mt. Hood FEIS (USFS 2006b)
66.	The herbicides picloram and imazapyr would not be used in broadcast applications within 100 feet of any TES or S/M plant species, and would not be used in spot applications within 10 feet of any TES or S&M plant species. In order to protect sensitive plant species in saturated or wet soils at the time of application, do not use picloram or imazapyr due to their mobility. Also, use aquatic triclopyr with caution as typical application rates can result in concentrations greater than the estimated or measured "no observable effect concentration" to aquatic plants.	Label advisories.
67.	Design manual treatments (e.g., pulling, digging) to avoid trampling or other direct impacts to individual TES or S/M plant species.	To protect TES or S&M plants.
68.	Do not use imazapic in areas previously treated with chlorsulfuron, metsulfuron methyl, sulfometuron methyl, or imazapyr.	To avoid damage to non-target plant species.
69.	When using sulfonylurea herbicides (chlorsulfuron, metsulfuron methyl, and sulfometuron methyl), use lowest application rates that will still be effective and do not use within 50 feet of known Sensitive, S&M plant species and other unique plant species identified by Forest Service botanists for protection.	To protect non-target vegetation from wind erosion effects. More conservative than Mars et al (1989).
To Ensure Protection of Heritage Resources		
70.	Avoid disking or plowing in eligible or unevaluated archaeological sites. Refer to implementation plan for avoidance measures in specific Project Area Units.	To protect cultural resources.
71.	Avoid burning where unevaluated or significant historic materials are present.	To protect cultural resources.
To Ensure Protection of Range Resources		
72.	Permittees will be made aware of annual treatment actions at the permittee annual operating plan meetings and/or if requested, notified in advance of spray dates.	The range label restrictions are included in herbicide info table (Appendix D to DEIS).
73.	Protection Buffer Widths permanent water sources used for livestock watering, such as water troughs associated with spring developments, reservoirs, trick tanks, and other sources developed for range use and listed as a range improvement. Temporary watering developments such as watersets, will have no restrictions except when in use and as needed to follow label restrictions. **Greater than 100 feet:** All treatments permitted. **100 to 10 feet:** All treatments, except broadcast spraying permitted. For herbicide treatment, use protective measures such as low-pressure spot-spray, directed spray applications, backpack applications, and/or protective barrier to prevent herbicide residues from impacting these species.	The measure will also protect wildlife that may use stock watering sources.

Less than 10 feet: No broadcast spraying permitted.

74. Some of the approved herbicides have use restrictions associated with domestic livestock that will be followed on public rangelands as listed in Grazing Restrictions Table, Appendix D — Label restrictions.

To Protect Wildlife

Northern Spotted Owl

75. Disturbing work activities (i.e. chainsaw, heavy equipment, etc) will not take place within 1/4 mile of the nest site or activity center of all known pairs or resident singles between March 1 and September 30. If activities occur within the nesting period, further consultation is required. The boundary of the 1/4-mile area may be modified by the District Wildlife Biologist based on topographic breaks or other site-specific information (generally, a 125-acre area will be protected). This condition may be waived in a particular year if nesting or reproductive success surveys reveal that spotted owls are non-nesting or that no young are present that year. Waivers are valid only until March 1 of the following year.

    There is no seasonal restriction on the use of roadside broadcast sprayers.

    To minimize disturbance. Source: Programmatic BA

Disturbance/disruption distances for Northern spotted owls during the breeding period (March 1 – September 30):

Activity	Disturbance distance	Disruption Distances	
	Breeding period (March 1 – September 30)	**Spotted owl critical breeding period (**March 1 – July 15)	**Remainder of the spotted owl breeding period** (July 16 – September 30)
Use of chainsaws	440 yards (0.25 mile)	65 yards	Use of chainsaws
Use of heavy equipment	440 yards (0.25 mile)	35 yards	Use of heavy equipment

Northern Bald Eagle

76. Invasive plant treatment activities that cause disturbance in excess of base levels that were occurring in 2001 (e.g. snowmobile, OHV, prescribed burning, automobile traffic, camping, hunting, firearm use, low level aircraft operation below 2,500 feet, recreational events) will not take place within 1/4 mile non line-of-sight or 1/2 mile line-of-sight of known bald eagle nests between January 1 and August 31. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that bald eagles are non-nesting or that no young are present that year. Waivers are valid only until January 1 of the following year. — To minimize disturbance. Source: Programmatic BA

77. Project activities that have potential to disturb bald eagle winter roosts, shall be restricted within 400 m of the roosting area from November 1 to April 30th. — To minimize disturbance. Source: Programmatic BA

Greater Sage Grouse

78. Do not use NPE-based surfactants in areas where sage grouse may forage.

79. Human activities within 0.3 mile of leks will be prohibited from the period of one hour before sunrise until four hours after sunrise and one hour before sunset until one hour after sunset from February 15 – May 15.

80. Do no conduct any vegetation treatments or improvement project in breeding habitats from February 15 – June 30.

Oregon and Columbia Spotted Frog

81. Avoid broadcast spraying of herbicides, and avoid spot spraying of glyphosate with POEA surfactant, sulfometuron methyl, and NPE-based surfactants, in or within 100 feet of occupied spotted frog habitat or suitable wetland habitat. Coordinate treatment methods, timing, and location with local Biologist.

Crater Lake Tightcoil Snail

82. In known sites or high potential suitable habitat outside of roadside treatment locations, avoid manual, mechanical, or herbicide treatments when soil moisture is high (generally late fall to late spring).

American Peregrine Falcon

83. Seasonal spatial and temporal restrictions shall apply to all known peregrine falcon nest sites for the periods listed below based on the following elevations:
    a. Low elevation sites (1000-2000 ft) 01 Jan - 01 July
    b. Medium elevation sites (2001 - 4000 ft) 15 Jan. - 31 July
    b. Upper elevation sites (4001+ ft) 01 Feb. 15 Aug.

84. Seasonal restrictions may be waived if the site is unoccupied or if nesting efforts fail and monitoring indicates no further nesting behavior. Seasonal restrictions shall be extended if monitoring indicates late season nesting, asynchronous hatching leading to late fledging, or recycle behavior which indicates that late nesting and fledging will occur.

85. The nest zones associated with those nest sites are described below.
    a. Primary: average of 0.5 mi radius from the nest site. Site-specific primary nest zones would be determined and mapped by local Biologist for each known nest site.
    b. Secondary: average of 1.5 mi radius from the nest site. Site-specific secondary nest zones would be determined and mapped for all known nest sites.
    c. Tertiary: a three mile radius from the nest site including all zones. The tertiary nest zones are not mapped; they apply to a circular area based on the 3-mile radius.

86. Protection of nest sites shall be provided until at least two weeks after all young have fledged.

87. Invasive plant activities within the secondary nest zone requiring the use of machinery shall be seasonally restricted. This may include activities such as mulching, chainsaws, vehicles (with or without boom spray equipment) or other mechanically based invasive plant treatment.

88. Non-mechanized or low disturbance invasive plant activities (such as backpack spray, hand pull, etc.) within the secondary nest zone shall be coordinated with the wildlife biologist on a case-by-case basis to determine potential disturbance to nesting falcons and identify mitigating measures, if necessary. Non-mechanized invasive plant activities such as back pack spray, burning, hand-pulling, lopping, and/or re-vegetation planting may be allowed within the secondary nest zone during the seasonal restriction period.

89. Picloram and clopyralid may be used within 1.5 miles of peregrine nest only once per year, in order to reduce potential exposure to persistent and bio-accumulating hexachlorobenzene.

90. All foot and vehicle entries in Primary nest zones shall be seasonally prohibited except for the following reasons:
    a. Biologists performing monitoring in association with the eyrie and coordinated with the District Biologist.
    b. Law enforcement specialists performing associated duties with notice to the District Ranger.
    c. Access for fire, search/rescue, and medical emergencies under

appropriate authority (Forest Service line officer or designee).

d. Trail access, when determined by a biologist to be non-disturbing.
e. And other exceptions on a case by case basis as determined by the Deciding Official.

Yellow Rail

91. At known breeding sites, no disturbance between May 15 and September 15, unless local biologist evaluates sites to modify permitted disturbance dates.
92. Do not use NPE-based surfactants in breeding or foraging areas.

Pygmy Rabbit

93. Activities in suitable burrowing habitat for pygmy rabbits will be restricted to one or two persons within suspected burrow areas, no heavy equipment, and manual or herbicide techniques only.
94. Do not use NPE-based surfactants in areas where pygmy rabbits may forage.

Table 15. Project Area Unit-Specific Project Design Features.

Watershed Name and Number	Project Area Number	Species Affected	Project Design Feature
Willow Creek 1707030602	75-20	Redband trout	Use clopyralid and possibly aquatic glyphosate in place of picloram to treat Russian knapweed
Willow Creek 1707030602	75-24	Non Native Fish	Use clopyralid and possibly aquatic glyphosate in place of Picloram to treat Russian knapweed
Upper Trout Creek 1707030701	All	Steelhead Redband Trout	Use of picloram restricted to treating sulphur cinquefoil weed populations.
Lower Whychus 1707030108	75-56	Steelhead Bull Trout Redband Trout	Use of clopyralid, and sulfometuron to treat medusahead, and diffuse knapweed restricted to 10 acres per year in canyons where slopes exceed 10 % and within 300 ft of perennial water.
Odell Lake 1707030102	12-02 12-16	Bull Trout Redband Trout	Use chlorsulfuron in place of picloram to treat butter and eggs or Dalmation toadflax
Bridge Creek 1707020403	All	Steelhead Redband Trout	Use of picloram restricted to treating sulphur cinquefoil and field bindweed species.
Mountain Creek 1707020113	All	Steelhead Redband Trout	Use of picloram restricted to treating sulphur cinquefoil and field bindweed species.
Rock Creek 1707020114	All	Steelhead Redband Trout	Use of picloram restricted to treating sulphur cinquefoil and field bindweed species.
Upper Middle John Day 1707020113	All	Steelhead Redband Trout	Use of picloram restricted to treating sulphur cinquefoil and field bindweed species.
Lower SF John Day 1707020113	All	Steelhead Redband Trout	Use of picloram restricted to treating sulphur cinquefoil and field bindweed species.
Dry Paulina Creek 1707030309	72-15 72-37	Redband Trout	No scarifying, burning or fire line construction within 50 feet of intermittent channels in areas selected for this treatment.

Table 16. Minimum Buffers (ft) for Herbicide Applications used in Alternative 2.

Herbicide	Perennial stream			Seasonal intermittent stream			Lake/Wetland		
	Broadcast spray	Spot-spray	Hand	Broadcast spray	Spot-spray	Hand	Broadcast spray	Spot-spray	Hand
Clopyralid	100	15	bankfull	50	15	*bankfull	100	15	*bankfull
Chlorsulfuron	100	50	bankfull	50	50	bankfull	100	50	bankfull
Aquatic Glyphosate	50	0	0	15*	0	0	*50	0	0
Glyphosate	300	100	50	100	50	50	300	100	50
Imazapic	100	15	bankfull	15	15	*bankfull	100	15	*bankfull
Aquatic Imazapyr	50	0	0	50*	0	0	*50	0	0
Imazapyr	100	50	15	100	50	bankfull	100	50	bankfull
Metsulfuron Methyl	100	15	bankfull	15	*15	*bankfull	100	15	*bankfull
Picloram	300	100	50	100	50	50	300	100	50
sethoxydim	300	100	50	100	50	50	300	100	50
Sulfometron Methyl	100	15	bankfull	50	15	bankfull	100	50	bankfull
Aquatic Triclopyr-TEA	X	15+	0	X	*15+	0	X	*15+	0
Triclopyr-BEE	X	150	150	X	50	50	X	50	50
Tank Mixtures	Use greatest buffer identified above.								

*If channel/wetland is dry there is no buffer.
+Follow up with EPA consultation.

Table 17. Minimum buffers (ft) for herbicide applications in Alternative 3 that can be used within 300 feet of water. No broadcast spraying would be allowed within buffers.

Herbicide	Perennial stream or river		Seasonal intermittent stream		Perennial Lake/Wetland		Seasonal Lake/Pond/Wetland	
	Spot-spray	Hand	Spot-spray	Hand	Spot-spray	Hand	Spot-spray	Hand
Clopyralid	15	10	15	bankfull	15	10	15	bankfull
Chlorsulfuron	50	10	50	bankfull	50	10	50	bankfull
Aquatic Glyphosate	10	10	bankfull	bankfull	10	10	bankfull	bankfull
Imazapic	15	10	15	bankfull	15	10	15	bankfull
Aquatic Imazapyr	10	10	bankfull	bankfull	10	10	bankfull	bankfull
Imazapyr	50	15	50	bankfull	50	10	50	bankfull
Metsulfuron Methyl	15	10	15	bankfull	15	10	15	bankfull
Sulfometron Methyl	15	10	15	bankfull	50	10	15	bankfull
Aquatic Triclopyr-TEA	15*	10	15*	bankfull	15*	10	15*	bankfull
Tank Mixtures	Use greatest buffer identified above.							

*Follow up with EPA consultation.

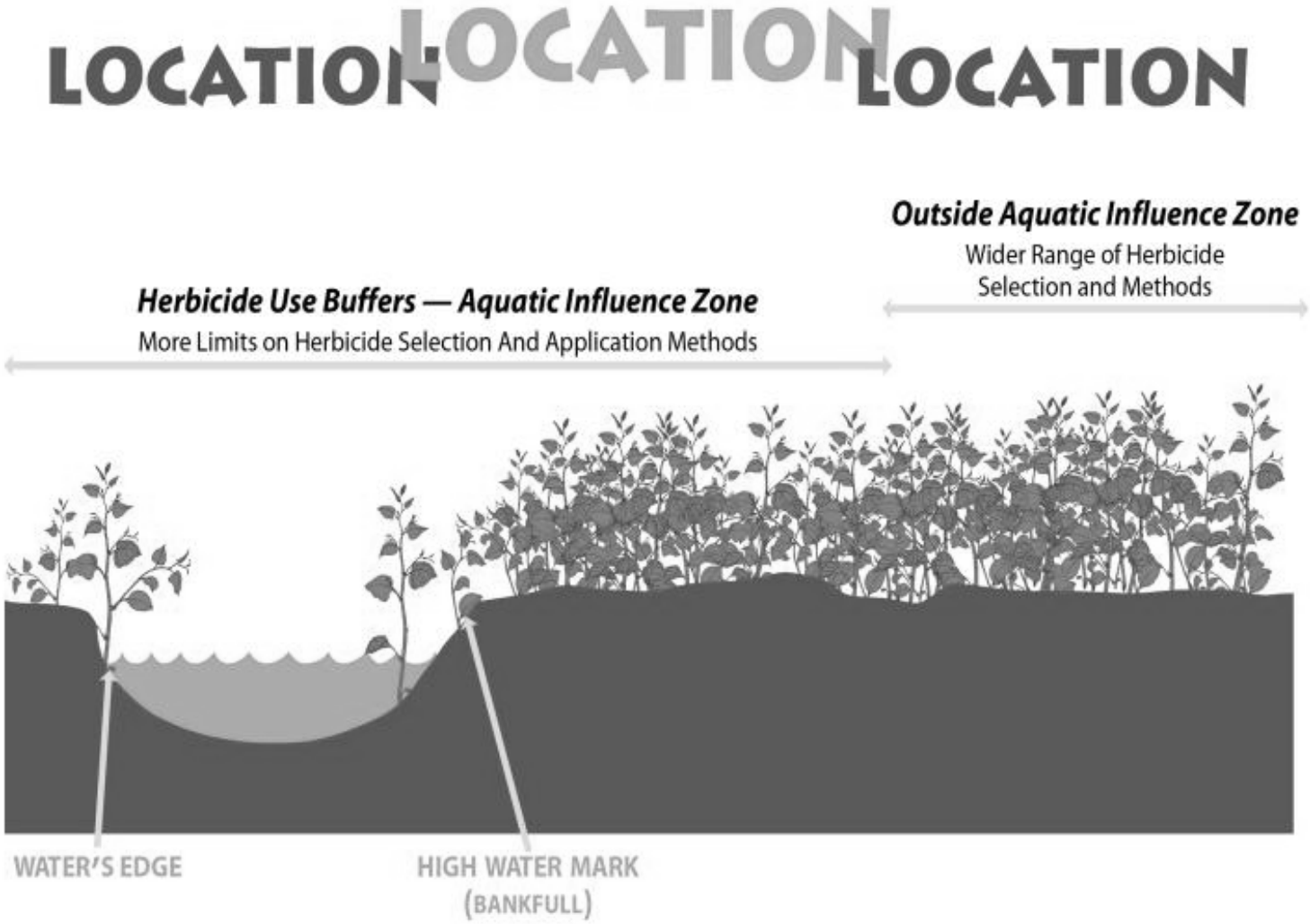

Figure 3. This picture shows how options for herbicide selection and application methods decrease in proximity to streams.

2.5 Alternatives Not Considered in Detail

Use Methods Other Than Herbicides

Some public comments showed a concern over the use of herbicides and suggested that we utilize other methods instead. This approach would not meet the purpose and need for action (timely treatment of invasive plant sites to meet the associated strategies of eradicate, control, contain, or suppress), for the following reasons:

Limits Effectiveness and Ability to Meet Purpose and Need

Effectiveness of treatments depends on the tools available. Alternatives that limit the variety of tools also limit the effectiveness of treatments (R6 FEIS p. 4-15). The Regional Forester considered making available to the Forests a more limited list of herbicides (R6 Invasive Plant Program ROD) but concluded that, based on analysis in the Regional Invasive Plant Program FEIS, it would restrict treatment effectiveness and increase costs. The Regional Forester's decision to approve 10 herbicides is expected to reduce the extent and rate of spread of invasive species, as well as reduce the use of herbicides over time (FEIS p. 4-25, ROD p. 9 and Appendix 2-1). The approved herbicides also pose low risks to humans and non-target organisms. Our site-specific treatment plan for the Deschutes and Ochoco NF and Crooked River NG employ these herbicides as part of an integrated weed management approach where the local conditions, objectives, and concerns are assessed so that treatment is effective, adverse effects are minimized or eliminated, and the Forests and Grassland would realize a reduction in the use of herbicides over time. The purpose and need could not be met without the use of herbicides.

For some invasive plant sites, the size of the population and/or nature of the invasive species require the application of herbicides for effective treatment. For example, houndstongue is rapidly expanding and threatens much of the Ochoco National Forest. Manual treatment of houndstongue over the last several years has cost tens of thousands of dollars, but had not been enough to stem the continued threat, as smaller satellite infestations continue to appear. Herbicides are necessary to control this invasive plant.

Also, for some invasive plants such as ribbongrass, manual and mechanical treatment is difficult and often ineffective regardless of the size of the population (see Chapter 3.3 for more information on effectiveness of treatments).

Similar to No Action

NEPA decisions have approved use of herbicides on 40 sites on the Deschutes National Forest (USFS 1998a), 72 sites on the Ochoco National Forest and Crooked River National Grassland (USFS 1998b), and one medusahead site on Paulina District, Ochoco National Forest (USFS 2005). These 113 sites represent only 6% of the total number of currently mapped sites (1,892). The No Action alternative would allow continued use of herbicides on these sites. Because these sites were approved for herbicide application 8 to 10 years ago, there have been ongoing treatments, and the amount of herbicide used at the sites has declined. The earlier NEPA documents also approved sites for manual or mechanical treatment. If No Action were selected, future manual and mechanical treatments that haven't already been approved would likely be categorically excluded from NEPA documentation. A "No Herbicide" alternative is very similar to the No Action alternative, which is being considered in this EIS. Environmental consequences and effectiveness of manual or mechanical treatments are discussed in Chapter 3.

Public Concern and Issue over Toxics Addressed in Project Design

Public comments expressed concern about potential adverse effects to humans from releasing chemicals into the environment. This issue is addressed by following label instructions, following regional Forest Plan standards for herbicide use, and by using appropriate application methods. Public notification, buffers around water intakes, and other project design features minimize potential for exposure. Both action alternatives incorporate measures to protect the public above and beyond the label instructions.

Restricted Herbicide use across Planning Area

Due to public comments and concerns surrounding the release of chemicals into the environment, the interdisciplinary team looked at two ways to restrict herbicide use across the project area: (1) Use herbicides as a tool of last resort, or (2) use herbicides only on highest priority sites.

The Regional Forester decided in 2005 (USFS 2005a) to not select a region-wide standard that would make herbicides a treatment of last resort. She explained that such a standard would deviate from integrated weed management principles that are part of Forest Service manual direction (FSM 2080.5): Integrated Weed Management: An interdisciplinary pest management approach for selecting methods for preventing, containing, and controlling noxious weeds in coordination with other resource management activities to achieve optimum management goals and objectives. Methods include: education, preventive measures, herbicide, cultural, physical or mechanical methods, biological control agents, and general land management practices, such as manipulation of livestock or wildlife grazing strategies, which accomplish vegetation management objectives.

As with the regional Record of Decision, the interdisciplinary team recommends that using herbicides as a tool of last resort in the project area would not be consistent with IWM principles. That option, therefore, was not analyzed further in this EIS.

Also, only using herbicides at high priority sites would be difficult because priorities will likely change due to changed conditions, new sites, or new species. Although some sites/species may not be the highest priority on the landscape, they may be best treated with herbicides; this would lead to some weed sites not being effectively treated, potentially allowing them to spread and would not meet this project's purpose and need. This option was therefore not analyzed further in the EIS.

As noted above under "Use Methods Other Than Herbicides," in order to address concerns over human health and exposure to herbicides, the interdisciplinary team developed project design features (PDFs) and built them into the action alternatives. These PDFs are an added layer of caution to the already-regulated and approved use of these chemicals. Section 2.4 details these project-specific features. Some people expressed concern about the effects of herbicides on human health. Section 3.2 discusses the layers of caution integrated into herbicide use and 3.8 discloses the expected health effects of the alternatives. Workers and the public may be exposed to herbicides used to treat invasive plants under all alternatives in this project; however, no exposures exceeding a threshold of concern are predicted. This conclusion is based on facts about chemistry of the herbicides considered for use and the mechanisms by which exposure of concern might occur.

No herbicide use within Riparian Reserves or Riparian Habitat Conservation Areas

Public comments included concerns about the use of herbicides in riparian areas and near water. Prohibiting the use of herbicides in RR/RHCAs would not meet the purpose and need for action. Alternative 3 is designed to address concerns about the aquatic environment and is based on scientific evidence of how herbicides can reach water when applied nearby. For example, because broadcast

application can increase the risk of herbicides drifting through the air and reaching water, Alternative 3 prohibits broadcast within 300 feet of perennial streams and lakes. Although the proposed action is not expected to have significant effects to the aquatic environment, Alternative 3 provides a comparison of a more restricted approach.

Certain invasive plant species are invasive in the riparian areas, such as ribbongrass, reed canarygrass, and yellow iris. These invasive plants are not likely to be controlled effectively with non-herbicide methods.

Analysis in the Region 6 Invasive Plant Program FEIS (USFS 2005a) discloses the effects of non-herbicide methods on fish, wildlife, and plants (Appendix J). According to the FEIS these methods could have more impacts in riparian areas than herbicides. For example, pulling, digging, or grubbing invasive plants can cause soil disturbance, with the potential for soil to move through erosion. The R6 FEIS expected that manual and mechanical treatments would cover relatively small areas and that utilizing these methods in larger areas could lead to increased erosion and stream sedimentation. In the case of some weed sites in the project area, if herbicides were not allowed the manual treatments would take place over much larger areas.

The proposed action and Alternative 3 address the issue of aquatic concerns, while allowing careful and appropriate application of herbicides where it is required to meet site objectives of eradicate, control, contain, or suppress. Refer to sections 3.6 and 3.7 for expected impacts to the riparian areas and aquatic organisms.

No Herbicide Use in Municipal Watersheds

An alternative was considered that would respond to the issues of human health and general toxicity of herbicides by not allowing any use of herbicides within municipal watersheds. There are three municipal watersheds in the planning area: Mitchell, Bend, and Sisters. There are also community water systems (such as Crescent) and other uses of water that originate on Forest Service land for personal consumption. There are currently very few known invasive plant sites within the municipal watersheds. This alternative was eliminated from detailed study because the following project design features were incorporated into the action alternatives in order to address the issue: coordination and agreement with departments managing municipal water systems, restriction on broadcast application, and buffers around water intakes.

Prohibit Biological Control

Some members of the public expressed concern over the use of biological control agents in our invasive plant treatment project. The concerns centered on risks to non-target species. Other commenters felt that biocontrol should be a larger part of our program because of the benign nature of the treatment method.

An alternative that did not allow the use of biological control agents was eliminated from further study because biological control agents authorized by the State and approved for use in Region 6 have been extensively researched and screened prior to release in the United States. Additionally, the Forest Service will be conducting annual review of research and monitoring data regarding biocontrol, and providing current information to the Forests to incorporate in annual implementation planning (Bulkin, pers. Comm. 2006).

Certain populations of some invasive plants necessitate the need for biological agents as a starting point to reduce invasive plant populations to a more manageable level, particularly in sensitive areas or where populations of a species are very large in size or the number of sites in an area. For example, Canada thistle sites on the Ochoco NF are so expansive that biocontrol is the only cost-effective method available at this time to get them to a more manageable size.

Maximize Worker Jobs

Because it takes more people to remove weeds by hand than it does to treat them with herbicides, manual treatment prescriptions would theoretically provide more jobs. Some public comments suggested that the Forest Service take this approach in our invasive plant treatment project. This would not meet our purpose and need for action. As with the discussion under "Prohibit Herbicide Use" there is ample evidence that relying on non-chemical methods alone will not be effective in meeting objectives at the hundreds of weed sites across the Forests and Grassland.

Maximize Cost Efficiency

The converse to the "Maximize Worker Jobs" approach, public comments suggested that we could be most effective and efficient by utilizing herbicides as much as possible. One of the new Forest Plan goals provided by the R6 ROD states "Implement invasive plant treatment strategies that protect sensitive ecosystem components, and maintain biological diversity and function within ecosystems. Reduce loss or degradation of native habitat from invasive plants while minimizing adverse effects from treatment projects." (USFS 2005b, p. Appendix 1-2). The proposed action described earlier in this chapter is consistent with the goals and is the most cost effective. The herbicides approved for use in the region have been selected for use across the Forests and Grassland according to where they would be most effective (refer to Appendix A and D). Sensitive ecosystems are protected and adverse effects are minimized by adhering to Forest Plan standards and locally-designed project design criteria.

Focus on Education and Prevention

Focusing on prevention and education rather than treatment would not meet the purpose and need for action. The purpose and need includes timely treatment of invasive plant sites and early control of new sites. Prevention alone is outside the scope of this EIS.

Prevention is an important component of invasive plant management. Executive Order 13112 (1999) requires federal agencies to prevent the introduction of invasive species as well as promote education on invasive species. Newly adopted goals, objectives, and standards in the R6 2005 ROD (USFS 2005b) address both the prevention and treatment aspects of integrated weed management. This direction applies to all alternatives, including No Action. In 2004 the Regional Forester directed National Forests in the region to develop local invasive plant prevention practices. These are included in this FEIS as Appendix G. Prevention is an ongoing consideration in managing National Forests, regardless of the decision resulting from this EIS. The Deschutes and Ochoco National Forests and Crooked River National Grassland also have an active education and outreach program.

In addition to requiring federal agencies to prevent the introduction and spread of invasives, the Executive Order also directs us to detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner. The need for this project is focused on treating currently known populations of invasive plants and responding quickly to newly detected sites. Scientific literature supports timely and appropriate treatment of invasive plants and restoration of native plant communities as important tools for effective integrated weed management (R6 FEIS, Ch. 3). For these reasons the alternative of prevention alone was not considered in detail.

2.6 Alternative Comparison

This section provides tables that summarize and compare the alternatives by the activities proposed, how each responds to the purpose and need; and how each responds to the issues and the related effects on the issue indicators.

Table 18. Comparison of Alternative Components

	Alternative 1	Alternative 2	Alternative 3
Total area authorized for treatments	2,204	52,015 acres	52,015 acres
Existing infestations treated	238 sites 2,204 acres	1,892 sites 14,547 acres	1,892 sites 14,547 acres
Estimated proportion of herbicide treatment	2% of inventoried sites	95% first year of treatment	95% first year of treatment
Allows herbicide use within 10 feet of perennial waterbodies	DNF – No OCH – Yes	Yes	No
Allows triclopyr, sethoxydim, and picloram within 300 feet of perennial waterbodies	No	Yes	No
Allows Herbicide use in Intermittent Channels when Dry	Yes	Yes	No
Includes approved biological releases	Yes	Yes	Yes
Includes an Early Detection – Rapid Response Strategy	No	Yes	Yes
Includes Restoration and Adaptive Management Plan	Limited testing	Yes	Yes

Table 19. Comparison of the Alternatives Based on How Each Responds to the Issues

Issue and Indicator ↓	Alternative 1	Alternative 2	Alternative 3
Treatment Effectiveness			
Acres Approved for Treatment	2,204	52,015	52,015
Known Infestation Treated	2,204 acres	14,547 acres	14,547 acres
Number of Herbicide Formulations Available	3 ONF, 4 DNF	10	10; 7 in riparian areas
Summary of Effectiveness	Least effective in controlling invasive plants: fewer acres treated and options most limited; No EDRR to limit spread of new sites	Most effective alternative in controlling invasive plants. 10 herbicides available for use; allows more broadcast; EDRR increases effectiveness	More effective than Alternative 1, but less than Alternative 2. 7 herbicides available near water; 10 everywhere else; EDRR increases effectiveness.
Social/Economic Aspects			
Total cost for all sites' first year of treatment	sites already covered by NEPA documentation have already had the first year of treatment	$2,205,290	$2,518,490
Acres treated in first year based on current budget	Approx. 2% of mapped weed site acres*	Approximately 10% of mapped weed site acres	Approximately 10% of mapped weed site acres
Average cost per acre	Manual $340 Herbicide $100 - $250	Manual $340 Herbicide $100 - $250	Manual $340 Herbicide $100 - $250
Jobs required for first year of implementing all acres	32	88	112
Water and Aquatic Species			

Issue and Indicator ↓	Alternative 1	Alternative 2	Alternative 3
Chemical treatments near Perennial Waterbodies	Deschutes NF – not allowed within 100 feet. Ochoco NF - some sites remaining from 1,045 acres of Treatment Areas in '98 EA	1,518 invasive plant site acres proposed for herbicides within 300 feet. 724 acres proposed within 100 feet.	1,288 invasive plant site acres proposed for herbicides within 300 feet. Broadcast spraying not allowed within 300 feet. 494 acres proposed within 100 feet.
Effects for Federally Listed and Region 6 Sensitive Fish Species	No direct impacts to fisheries or aquatic invertebrates from continuing treatments. Potential for indirect effects where riparian areas not treated. Invasives prohibit native vegetation which provides shade from becoming established.	Major impacts prevented with PDFs. Potential risk for effects to bull trout and redband trout from herbicide treatments near water. No measurable effects from manual, mechanical and cultural methods except in Metolius River where cover would be reduced.	Major impacts prevented with PDFs. Reduced risk of herbicide residue washing into streams. Reduced risk of direct overspray to water. Effective control of ribbongrass not possible. Invasives would continue to degrade habitat. No measurable effects from manual mechanical and cultural methods except in Metolius River where cover would be reduced.
Human Health and Public Notification			
Worker Safety	No Significant Impact (FONSI) from ongoing treatments (previous NEPA determination)	Project design features eliminate plausible harmful exposure scenarios.	Same as Alt. 2
Drinking Water	No Significant Impact (FONSI) from ongoing treatments (previous NEPA determination)	Project design features eliminate plausible harmful exposure scenarios.	Same as Alt. 2
Public Health	No Significant Impact (FONSI) from ongoing	Project design features eliminate plausible harmful exposure scenarios.	Same as Alt. 2

Issue and Indicator ↓	Alternative 1	Alternative 2	Alternative 3
	treatments (previous NEPA determination)		
Native Plant Communities			
Effects to Federally Listed Plant Species	No Effect	No Effect	No Effect
Effects to Sensitive Plant Species	Invasive plant sites would continue to expand causing further degradation of native plant habitats and potential loss of additional rare plants. Less risk of non-target effects from herbicide. Highest risk to Sensitive plants from loss of habitat.	Some individual plants may be impacted by treatments in short term (1-5 years), but there will be beneficial effects to native plant habitats. Treatments will not lead to a trend toward federal listing. More herbicide options help plan treatments that minimize non-target effects.	Some individual plants may be affected in short term (1-5 years) but there will be beneficial effects to native plant habitats. Treatments will not lead to a trend toward federal listing. Restrictions on broadcast spraying (within riparian reserves) will further minimize potential short-term impacts to non-target veg.
Effects to Survey & Manage Plants	Low potential risk to individual plants from non-target effects of herbicide. Highest risk to survey and manage plant species from loss of habitat.	Individual plants could be harmed in short-term. Low risk that herbicide treatments would impact S&M plant species. In long term, S&M plant species will benefit from treatment effectiveness.	Individual plants could be harmed in short-term. Low risk that herbicide treatments would impact S&M plant species. Broadcast restrictions may reduce potential impacts to non-vascular plants in riparian zone. In long term, S&M plant species will benefit from treatment effectiveness.
Summary Effects to Native Vegetation	Native vegetation will continue to be impacted by invasive plants.	PDFs minimize or eliminate short-term effects to native vegetation from herbicide treatments.	PDFs minimize or eliminate short-term effects to native vegetation from herbicide treatments.

Issue and Indicator ↓	Alternative 1	Alternative 2	Alternative 3
	Less risk of damage to individual native plants from herbicides. Long-term risk to native vegetation from spread of invasive plants.	Native plant habitats will benefit from invasive plant treatments.	Native plant habitats will benefit from invasive plant treatments. Riparian native plants may continue to be impacted by rhizomatous invasive plant species.
Wildlife, Threatened & Endangered Species			
Spotted Owl	No direct adverse effects from ongoing treatment.	No Effect to critical habitat May Affect, Not Likely to Adversely Affect	No Effect to critical habitat May Affect, Not Likely to Adversely Affect
Bald Eagle	No Effect	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Canada Lynx	No Effect	No Effect	No Effect
Wildlife, Regional Forester Sensitive Species			
pygmy rabbits, sage grouse, harlequin duck, yellow rail, spotted frogs and Crater Lake tightcoil snail.	No direct adverse effects from ongoing treatment.	May impact, but not likely to lead to a trend toward federal listing	May impact, but not likely to lead to a trend toward federal listing
California wolverine, Pacific fisher, grebes, bufflehead, upland sandpiper, American peregrine falcon, gray flycatcher, tricolored blackbird,	No direct adverse effects from ongoing treatment.	No Impact	No Impact

*Only as approved for certain sites in 1998 Ochoco Weed EA or 1998 Deschutes Weed EA.